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Editor: D. B. Finn

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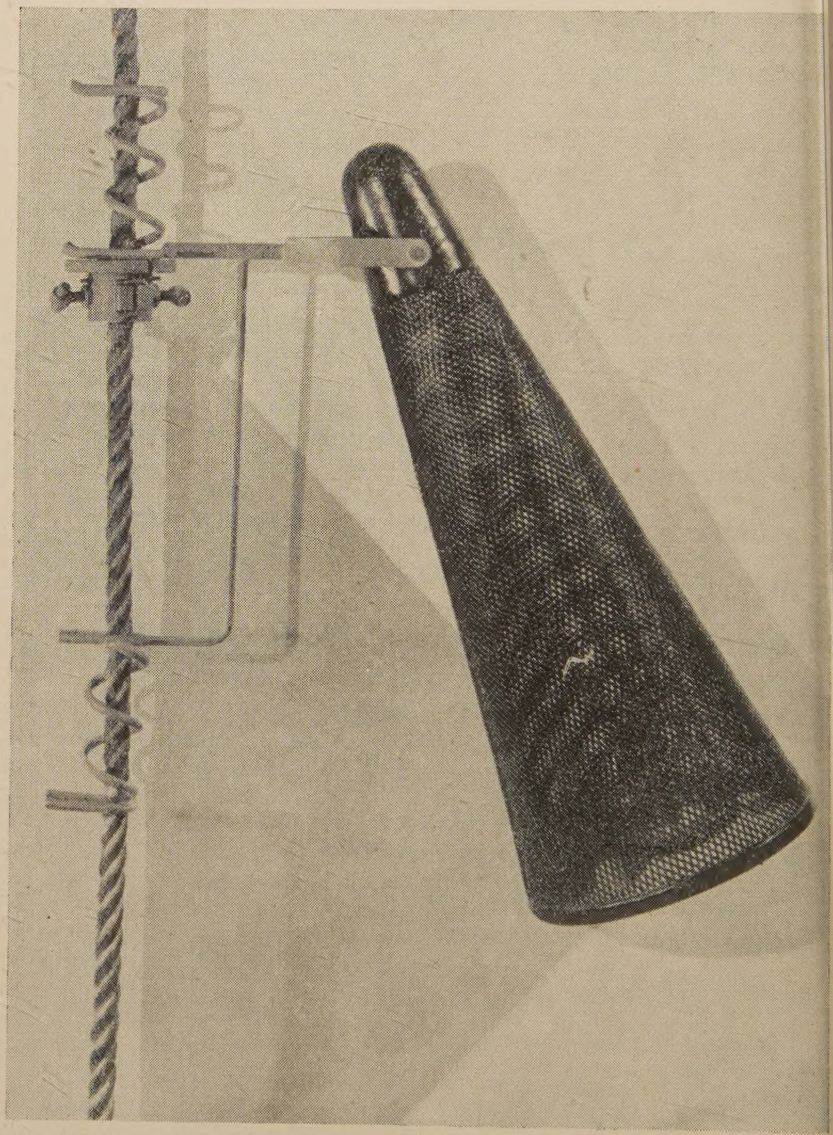

Figure 1. The fishermen's current cone shown attached to a rope and taking up its position at an angle to the vertical as it would in a water current of about $^1/_2$ knot

(See article on pp. 130-140)

REPORT ON THE UNITED NATIONS TECHNICAL CONFERENCE ON THE CONSERVATION OF THE LIVING RESOURCES OF THE SEA

Part 1

The International Technical Conference on the Conservation of the Living Resources of the Sea, convened by the United Nations, was held at FAO, Rome, from 18 April to 10 May 1955.

The Conference resulted from resolution 900 (IX), which was adopted by the General Assembly of the United Nations on 14 December 1954. The first six paragraphs of the resolution read :

The General Assembly

Considering that the International Law Commission has proposed for the consideration of the General Assembly draft articles covering certain basic aspects of the international regulation of fisheries, and considering also that that Commission has not yet concluded its study of related questions,

having regard to the fact that the problem of the international conservation of fisheries involves matters of a technical character which require consideration on a wide international basis by qualified experts,

being of the opinion that an international technical conference should be held in the near future to consider the problems of fishery conservation and make recommendations thereon,

recalling that, by resolution 798 (VIII) of 7 December 1953, the General Assembly, having regard to the fact that the problems relating to the high seas, territorial waters, contiguous zones, the continental shelf and the superjacent waters are closely linked together juridically as well as physically, decided, consequently, not to deal with any aspect of those topics until all the problems involved had been studied by the International Law Commission and reported upon it to the General Assembly.

Having regard to the fact that the technical studies relating to the conservation, protection and regulation of fisheries and other resources of the sea are also closely linked to the solution of the problems mentioned in the preceding paragraph,

1. requests the Secretary-General to convene an international technical conference at the headquarters of the Food and Agriculture Organization of the United Nations on 18 April 1955 to study the problem of the international conservation of the living resources of the sea and to make appropriate scientific and technical recommendations which shall take into account the principles of the present resolution and shall not prejudge the related problems awaiting consideration by the General Assembly....

The other paragraphs of the resolution dealt mainly with invitations to member states, Specialized Agencies and inter-governmental organizations and with the arrangement of facilities.

The Conference was declared open by A. Pelt, representative of the Secretary-General of the United Nations. His Excellency Signor Di Medici, Italian Minister of Agriculture and Forests, then welcomed the delegates on behalf of his Government. Dr. P.V. Cardon, Director-General of FAO, spoke next, followed by Mr. Pelt, who invited nominations for the office of chairman. D. Olafsson (Iceland), seconded by Francisco V. García-Amador (Cuba), proposed K. Sunnanaa (Norway), who was unanimously elected and, after a short speech by Mr. Sunnanaa, the meeting rose.

At meetings on subsequent days, a deputy chairman and ten vice-chairmen were elected, and the Credentials, Nominations, and General Committees were appointed. Subsequently, three sub-committees were also appointed by the General Committee. In addition to the chairman, officers of the Conference were as follows :

Deputy Chairman	Francisco V. García-Amador (Cuba)
Vice-Chairmen	José Alvarez del Villar (Mexico) Francis F. Anderson (Australia) Konstantin Babaian (U.S.S.R.) B. M. Chopra (India) Umberto d'Ancona (Italy) Pedro Diaz de Espada (Spain) Motosuku Fujinaga (Japan) William C. Herrington (U.S.A.) Luis Edgardo Llosa (Peru) Ronald Wall (U.K.)
Members of the Credentials Committee	Brazil, Canada, Egypt, Indonesia, Japan, Mexico, the Netherlands, Poland, Union of South Africa
Members of the Nominations Committee	Argentina, Canada, France, Greece, India, Poland
Members of the General Committee	José Alvarez del Villar (Mexico) Francis F. Anderson (Australia) Konstantin Babaian (U.S.S.R.) B. M. Chopra (India) Umberto D'Ancona (Italy) Pedro Diaz de Espada (Spain) M. Fujinaga (Japan) Francisco V. García-Amador (Cuba) William C. Herrington (U.S.A.) Luis Edgardo Llosa (Peru) Klaus Sunnanaa (Norway) (Chairman) Ronald Wall (U.K.) Secretary : James Baster

Members of Sub-committee 1	Jan Bilinski (Poland) C. Herrena (Colombia) John L. Kask (Canada) (Chairman) Gusti Kusuma (Indonesia) Gunnar Rollefsen (Norway) Secretary : S.J. Holt (FAO)
Members of Sub-committee 2	José Alvarez del Villar (Mexico) B. Havinga (Netherlands) (Chairman) Petr Moiseev (U.S.S.R.) Oscar E. Sette (U.S.A.) James Thomson (Australia) Secretary : Milner B. Schaefer (U.N.)
Members of Sub-committee 3	Aleksandre Bogdanov (U.S.S.R.) William C. Herrington (U.S.A.) (Chairman) N. Kesava Panikkar (India) Enrique Ponce (Ecuador) Aristide Québriac (France) Secretary : M. Girard (FAO)

Representatives of 45 countries attended, namely: Argentina, Australia, Belgium, Brazil, Canada, Chile, Taiwan (Formosa) Colombia, Costa Rica, Cuba, Denmark, Ecuador, Egypt, El Salvador, France, Western Germany, Greece, Guatemala, Honduras, Iceland, India, Indonesia, Israel, Italy, Japan, Korea, Mexico, Monaco, Netherlands, Nicaragua, Norway, Panama, Paraguay, Peru, Poland, Portugal, Spain, Sweden, Turkey, Union of South Africa, U.S.S.R., United Kingdom, U.S.A., Uruguay, Yugoslavia.

In addition to representatives, there were observers from Bolivia, Ceylon, Dominican Republic, Roumania, Thailand and Venezuela as well as from the following inter-governmental organizations : FAO, General Fisheries Council for the Mediterranean, Indo-Pacific Fisheries Council, Inter-American Tropical Tuna Commission, International Commission for the Northwest Atlantic Fisheries, International Council for the Exploration of the Sea, International North Pacific Fisheries Commission, International Pacific Halibut Commission, International Pacific Salmon Fisheries Commission, International Whaling Commission, Permanent Commission for the Exploitation of the Maritime Resources of the South Pacific, and UNESCO.

More than 150 delegates and observers attended the Conference. The Executive Secretary was James Baster, of the United Nations, assisted by M. J. Girard, FAO Fisheries Division. The legal adviser was Dr. Yuen-Li Liang, of the United Nations, and the technical consultants were Dr. A. Fridriksson and Dr. M.B. Schaefer, both of the United Nations. F.N. Fitz-Gerald (FAO) was Conference Liaison Officer. The secretariat consisted of more than 100 persons, including 86 temporary staff.

There were 24 plenary sessions, and almost 300 documents, totaling nearly 1,400 pages, were produced for the plenary and committee meet-

ings, in English, French and Spanish. The following agenda was adopted and discussed :

1. Opening of the Conference by the representative of the Secretary-General of the United Nations.
2. Election of the chairman.
3. Adoption of rules of procedure.
4. Appointment of a credentials committee.
5. Adoption of the agenda.
6. Election of a deputy chairman.
7. Report of the Credentials Committee.
8. Election of vice-chairmen.
9. Objectives of fishery conservation.
10. Types of scientific information required for a fishery conservation program, e.g.
    (*a*) extent of separation of the fishery resource into independent or semi-independent populations (" conservation management units ") ;
    (*b*) magnitude and geographical range of the populations constituting the resource ;
    (*c*) pertinent facts respecting the life history, ecology and behavior of the species constituting the resource ;
    (*d*) effects of intensity and kind of exploitation of the resource ;
    (*e*) relationships of the resource to other species being exploited simultaneously.
11. Types of conservation measures applicable in a conservation program.
12. Principal specific international fishery conservation problems of the world and measures and procedures applicable and being applied for their solution :
    (*a*) problems for the resolution of which agreed international measures and procedures have been instituted in the following areas :
        (*i*) North Atlantic,
        (*ii*) South Atlantic,
        (*iii*) Mediterranean,
        (*iv*) Indo-Pacific,
        (*v*) North Pacific,
        (*vi*) South Pacific,
        (*vii*) Antarctic and other whaling areas ;
    (*b*) International conservation problems requiring solution in the above-mentioned areas and elsewhere ;
    (*c*) applicability of existing types of international conservation measures and procedures to pending problems.
13. International conservation problems for the resolution of which existing types of international measures and procedures are inadequate and possible means of resolving them.
14. Other business.
15. Adoption of the report of the Conference.

In the course of the Conference the following 27 technical papers were submitted :

Section I. General Background Papers

1. " Types of Scientific Information Required for a Fishery Conservation Program, and Types of Conservation Measures Applicable in a Conservation Program, " by Milner B. Schaefer.
2. " Concepts of Conservation, " by Michael Graham.
3. " Pertinent Aspects of the Life History of Given Resources of the Sea in Relation to the Physical Environment, " by the United Nations Educational Scientific and Cultural Organization (UNESCO).
4. " International Fishery Conservation Problems and Solutions Developed in Existing Conventions, " by William C. Herrington and John L. Kask.
5. " International Fisheries Convention 1946, " by C.E. Lucas.
6. " Identification of Types of International Fisheries Conservation Problems for the Handling of which the Governments concerned have not yet Developed or Agreed upon Measures or Procedures, " by G.L. Kesteven and S.J. Holt.
7. " A First Approximation to a Modern Theory of Fishing, " by Michael Graham.

Section II. Papers submitted by International Fisheries Organizations

1. " Conservation Problems in the Northwest Atlantic and Related Activity of the International Commission for the Northwest Atlantic Fisheries (ICNAF), " by Erik M. Poulsen.
2. " The Contribution of Oceanographic Research to Fisheries Science, " by G.L. Kesteven and G.E.R. Deacon.
3. " Scientific Investigation of the Tropical Tuna Resources of the Eastern Pacific, " by Milner B. Schaefer.
4. " Management of the Halibut Fishery of the North-eastern Pacific Ocean and Bering Sea, " by Henry A. Dunlop.
5. " The International Fraser River Sockeye Salmon Fishery, " by Loyd A. Royal.
6. " The International Whaling Commission, " by Remington Kellog.
7. " Note on the General Fisheries Council for the Mediterranean (GFCM), " by M.J. Girard.

Section III. Other Papers

1. " Stock and Recruitment, " by W.E. Ricker.
2. " The Conservation of Biological Resources in Coastal Waters, " by G. Belloc.

3. " Fluctuations in the Commercial Fish Population of the Northwest Pacific in Relation to Meteorological and Oceanographic Conditions, Fishery Operations and Other Factors, " by P.A. Moiseev.
4. " The Biological Appraisal of the Ocean and the Problem of Transoceanic Acclimatization, " by L.A. Zenkevich.
5. " Comments on the Principle of Abstention, " by William C. Herrington.
6. " Fisheries Problems and Fishery Conservation in Italy, " by the Italian Delegation to the International Technical Conference on the Conservation of the Living Resources of the Sea.
7. " Migrations of the Sardine (*Sardina pilchardus* Walb.) in Relation to Zooplankton, " by T. Gamulin.
8. " Pertinent Facts Respecting the Life History, Ecology and Behavior of the Important Species Constituting the Fishery Resources in the Seas around Japan, " submitted by the Japanese Delegation.
9. " Information Concerning the Importance of Conservation of Stocks of Fish and Sea Mammals in Arctic Waters, " by Paul Hansen.
10. "Productivity and Intensity of Exploitation of the Adriatic," by Sime Zupanovič.
11. Comments by the Korean Delegation on the Paper submitted by the Japanese Delegation.
12. " Quelques aperçus sur la production des pêcheries maritimes en Egypte, " by Mokamed Zohdi.
13. Comments by the Japanese Delegation on the paper submitted by the Korean Delegation.

Part 2

The plan for the discussions at this meeting had a deceptive appearance of simplicity. There were only five substantive items on the agenda. The first three dealt with general principles, and some thought that, agreement being reached on the objectives of conservation, the scientists would, without difficulty, assemble schedules, firstly, of information required for conservation programs and, secondly, of the measures to be taken in such programs, and that these would serve as a firm basis for discussion of various types of situations in which conservation measures were appropriate. However, although agreement could be reached on some elements of this plan, it was found that important points of difference prevailed. It is probably an over-simplification to consider the question of the status and responsibilities of the coastal state as the cause of the difficulties encountered by the Conference, but it certainly claimed much attention.

In considering the objectives of conservation the Conference sought a broad definition. Much time was spent in search of a formula that

would compress into relatively few words the essential biological and technical ideas associated with this term. To some people it may seem that the final result refers neither to conservation alone, nor to the whole of conservation. And it might be held that this lack of precision, if such it is, was the basis on which developed the controversy concerning the need to include in this definition a reference to the interest of the coastal state. The discussion of this question in the plenary sessions gave the first indication of the difference among the delegations. The original definition of the objectives of conservation, submitted by the General Committee to the Plenary Session, was as follows :

1. Conservation is essential in the development of a rational exploitation of the living resources of the seas. Consequently, conservation measures should be applied when scientific evidence shows that fishing activity adversely affects the magnitude and composition of the resources or that such effects are likely.

2. The immediate aim of conservation of living marine resources is to conduct fishing activities so as to increase, or at least to maintain, the average sustainable yield of products in desirable form. At the same time, wherever possible, scientifically sound positive measures should be taken to improve the resources.

3. The principal objective of conservation of the living resources of the seas is to obtain the optimum sustainable yield so as to secure a maximum supply of food and other marine products.

Even in this formulation, it will be seen there were included terms such as " in desirable form " and " maximum supply of food and other marine products " which are outside the scope of biological science, and in this form, perhaps, incapable of objective definition by any science. Subsequently, the Conference added to paragraph 3 of this formulation (by 18 votes against 17, with 8 abstentions) the following :

> When formulating conservation programs, account should be taken of the special interests of the coastal state in maintaining the productivity of the resources of the high seas near to its coasts.

In the debate on the motion to include this sentence, the question was vigorously discussed whether or not social and economic aims were properly to be included among the objectives of conservation. Some of those who opposed their inclusion were, nevertheless, of the opinion that social and economic factors might be discussed by the Conference elsewhere in the agenda ; others held that these matters were totally outside the terms of reference of the Conference. In the course of the debate the issue began to crystallize around the specific problem of the place of the coastal state in the matter of conservation, and more particularly around that of any special interest, rights, duties, or responsibilities which such a state might have in respect of conservation. In this context, the attention of the Conference became progressively focussed on the question whether or not any proposals to define the

position of the coastal state were within the competence of the Conference. This question was discussed at length, mainly with reference to the stipulation in the terms of reference that recommendations by the Conference " shall not prejudge the related problems awaiting consideration by the General Assembly. " In the event the Conference came to the decision (taken by a vote of 21 against 20 with 3 abstentions), that it was not competent to deal with a specific proposal concerning the situation of the coastal state, but differences of opinion on this point continued to dominate the proceedings to the end, as will be seen from the quotations below taken from other sections of the report. However, the debate was of a procedural character and no systematic discussions of the economic and social aspects of fishery conservation took place. Except for such general references as those to the desirable form of products, to maximum supply of food and other marine products, and to the special interest of the coastal state (in Section II and elsewhere in the report), the economic and social aspects of conservation remained unidentified. Nor did the Conference enquire into the extent to which these economic and social aspects were amenable to scientific investigation and description, or to what extent they might enter into conservation measures. The schedules in Sections III and IV of the report accordingly contain no reference to them.

In spite of this omission, to which the Chairman adverted in his closing speech, and in spite of its preoccupation with the problem of the coastal state, the Conference was able to compile, from the material submitted and from discussion, a useful summary of information under the principal headings of its agenda. Section III of the final report presents a schedule of the kinds of scientific information that must be obtained in respect of a particular fishery to determine whether there is a need for conservation measures.

This schedule is essentially an elaboration of the sub-items of Item 10 of the Agenda.

In Section IV of the report the Conference developed a schedule of conservation measures which may be employed in a conservation program. This schedule is in four parts, of which the first refers to the regulation of the amount of fishing, the second to protection of fish of various sizes, the third to measures designed to assure adequate recruitment, and the fourth to measures for improvement and increase of marine resources. The last part includes artificial propagation, acclimatization and transplantation. Section V of the Report contains a resumé by regions of the provisions of existing international conservation programs. From this resumé, the Conference then adduced a set of principles which are seen to prevail from these provisions and which the Conference believed should be recognized in the formulation of new conventions.

As stated above, these sections of the report referring to items 9, 10, 11, and 12*a* and *b* of the agenda, deal with general principles and the description of the existing situation. In turning, then, to the applicability of existing types of international conservation measures and procedures to other international fishery conservation problems,

Conference found itself again involved in the controversy concern-
the coastal state.

The difference of opinion which emerged between the two groups
tates is summed up in Section VI (The Applicability of Existing
es of International Conservation Measures and Procedures to Other
rnational Fishery Conservation Problems), Part A, (Problems of
Coastal State — Extent of Interest and Responsibility), of the
report, the first four paragraphs of which state :

(1) As regards coastal states, two trends of thought became apparent during the Conference, as to the place of such a state in the matter of conservation. All agreed that conservation measures adequate both from the technical and scientific points of view should, where needed, be introduced in the areas in question in order to prevent all those in the various countries who are concerned with the fisheries from causing any decrease in the sustainable yield of the resources.

(2) According to one group, however, the coastal state has a special interest in the measures of conservation to be applied. Within this group, the points of view expressed concerning the rights and duties of the coastal state covered a wide range. These varied from the proposal which was accepted by the Conference and appears in Section II, paragraph 3 of this report, that the coastal state be regarded as having a special interest in the conservation of the living resources of the sea adjacent to its coasts, to the proposal that the coastal state alone should be entrusted with control and conservation measures in areas near its coast, with no necessary limitation except that the measures should be in accord with the general principles of a technical character adopted at the Conference, and should be based on the maintenance of the existing ecological system in a given maritime zone. The view was also expressed that, in considering the application of conservation measures, the people nearest to, and dependent on, the resources for food should be given first consideration. These views result from the argument that the coastal state has a special interest and responsibility for the conservation of the biological wealth near its shores and that it is in consequence the best qualified to be entrusted with the task of conservation.

(3) It was also emphasized in the discussions in this connection that the special interests of the coastal state should be regarded as related to the resources or stocks which the states concerned aim to conserve through efforts which they make, or through the various measures which they may take, as for example the development of fisheries by artificial means, such as acclimatization, the improvement of the natural environment of the fishery, etc.

(4) The second point of view is that the coastal state should refrain from adopting any conservation measures for high seas fisheries applicable to the nationals of other countries, without the agreement of the other states concerned. This view proceeds from the consideration that conservation measures should be based on scientific and technical evidence, that the coastal state is not necessarily better qualified than other states concerned to assess scientific truth, and that all states concerned should be entitled to supply pertinent scientific evidence and to have it considered on an equal footing, with a view to formulating adequate conservation measures.

The Conference pointed out in the final report (Section IV) t there are various types of conservation measures which may be u to protect and develop fisheries and that :

> the determination of which of these measures should be app in a given conservation program will depend on the details of life history, ecology, population dynamics, and behavior of species constituting the resource and on the technical nature the fishing.

Scientific investigation of these matters is necessary before re lations are made.

The Conference pointed out that, for the efficient operation of international fishery conservation program, it is necessary for all states concerned with the fishery in question to participate in the pr aration, negotiation and establishment of the conservation conventi It is also necessary that conventions should fully define rights a duties of the member countries, and the commissions concerned sho not have imposed on their authority limitations that would only res in a reduction in their effectiveness and delay in achieving results. was also pointed out that lack of co-operation by any state fishing the areas covered by conventions may result in the conventions beco ing ineffective.

In considering problems created by new entrants into fisher under conservation management, the Conference stressed that an esta ished conservation program can be made ineffective if new entra are not committed to observe the regulations.

The Conference considered three aspects of this problem and r lated them to existing procedures. These are dealt with in Part of Section VI of the final report, and read as follows :

> 18. *Case I.* A special case exists where countries, through r search, regulation of their own fishermen and other activitie have restored or developed or maintained stocks of fish that their productivity is being maintained and utilized levels reasonably approximating their maximum sustainab productivity, and where the continuance of this level of pr ductivity is dependent upon such continued research a regulation. Under these conditions, the participation of a ditional states in the exploitation of the resource will yie no increase in food to mankind, but will threaten the succe of the conservation program. Where opportunities exi for a country or countries to develop or restore the produ tivity of resources, and where such development or restor tion by the harvesting state or states is necessary to mainta the productivity of resources, conditions should be ma favorable for such action.
>
> 19. *Existing procedures.* The International North Pacific Fisheri Commission provides a method for handling the special ca mentioned above. It was recognized that new entrants such fisheries threatened the continued success of the co servation programs. Under these circumstances the state states not participating in fishing such stocks agreed to a stain from such fishing when the Commission determin that the stock reasonably satisfies all the following con tions :

(*a*) evidence based upon scientific research indicates that more extensive exploitation of the stock will not provide a substantial increase in yield ;

(*b*) the exploitation of the stock is limited or otherwise regulated for conservation purposes by each party substantially engaging in its exploitation ; and

(*c*) the stock is the subject of extensive scientific study designed to discover whether it is being fully utilized, and what conditions are necessary for maintaining its maximum sustained productivity.

The Convention provides that, when these conditions are satisfied, the states which have not engaged in substantial exploitation of the stock will be recommended to abstain from fishing such stock, while the states engaged in substantial exploitation will continue to carry out the necessary conservation measures. Meanwhile the abstaining states may participate in fishing other stocks of fish in the same area.

20. *Case* 2. A somewhat different case was discussed, involving new entrants into a fishery which a coastal state is regulating for conservation purposes, and when existing scientific evidence indicates the necessity of continuing such regulations for conservation purposes.

21. *Existing procedures.* In general this conservation problem can be handled if the new entrant should declare itself ready to observe the conservation regulations in force and undertake to co-operate with the other States concerned in carrying out the relevant program of research and management.

22. *Case* 3. A variation of this problem exists where the intensive exploitation of offshore waters adjoining heavily fished inshore waters, by a new fishing operation initiated either by the coastal states or by another state, considerably effects the abundance of fish in the inshore waters.

23. *Existing procedures.* The conservation aspect of the problem is taken care of if the entire area in which the stocks are fished, including both the inshore and offshore portions, is included within a single conservation system and is subjected to conservation regulations adequate to maintain the maximum sustainable yield.

In considering areas which, although exploited by several countries, are still without any agencies for the study of conservation problems and the development of conservation measures by agreement, the Conference came to the conclusion that material presented was not adequate for delegates to make a full appraisal, and referred especially to the inadequacy of statistics and other scientific data. The Conference also named some of the areas and fisheries that require attention. These are included in the following list, which is not complete as it covers only species mentioned at the Conference :

Area	*Fisheries*	
Northwest Pacific	Fur Seal	(*Callorhinus ursinus*)
	Pacific Salmon	(Genus Onchorhynchus)
	Herring	(*Clupea pallasii*)
	Sardine	(*Sardinops melanosticta*)
	Flat Fishes	(Several genera and many species)

Area	*Fisheries*	
Southeastern Pacific	Anchovies	(*Engraulis ringens*)
Mediterranean	Trawl Fisheries	
Northeast Atlantic	Herring	(*Clupea harengus*)
Baltic Sea	Plaice	(*Pleuronectes platessa*)
	Flounder	(*Pleuronectes flesus*)
	Salmon	(*Salmo salar*)
	Cod	(*Gadus callarius*)
Arctic Seas	Seals and other aquatic mammals	(*Phoca groenlandica*) (*Phoca foedita*) (*Erignathus barbatus*) (*Rosmarus marinus*) and others
Various Seas	Shrimp resources developed in recent years	

Under the heading of "General Conclusions" (Section VII of the final report), the Conference noted "with satisfaction conservation measures already carried out," and went on to affirm that "international co-operation in research (including statistical investigation) and regulation in the conservation of living resources of the high seas is essential." In the "General Conclusions," reference is made to the conservation measures now being carried out and to the fact that the present system of international fisheries regulations is generally based on the geographical and biological distribution of the marine populations and that, from the scientific and technical point of view, this seems generally to be the best way to handle problems involved. "From the desire expressed during this Conference by all participating nations to co-operate in research," states the report, "and from the guidance given by existing conventions, it appears that there are good prospects of establishing further conservation measures where and when necessary."

The report then gives (Section VII, par. 3) "guiding principles in formulating conventions." These are:

1. A convention should cover either:
   (*a*) one or more stocks of marine animals capable of separate identification, and regulation; or
   (*b*) where, because of intermingling of stocks or for other reasons, research on and regulation of specific stocks as defined in (*a*) is impracticable, such research and regulation should cover a defined area, taking into account scientific and technical factors.
2. All states fishing the resource, and adjacent coastal states, should have an opportunity of joining the convention and of participating in the consideration and discussion of regulatory measures.
3. Conservation regulations introduced under a convention should be based on scientific research and investigation.
4. All signatory states should, so far as practicable, participate directly or through the support of a joint research staff in

scientific research and investigation carried out for purposes of the convention.

5. All conventions should have clear rules regarding the rights and duties of member nations, and clear operating procedures.
6. Conventions should clearly specify the kinds or types of measures which may be used in order to achieve their objectives.
7. Conventions should provide for effective enforcement.

Where disagreements arise among states as to scientific or technical matters relating to fishery conservation, the Conference suggested that a solution might be found by referring such disagreements to a suitably qualified body of impartial experts and by all states participating in the fishery agreeing to accept the responsibility to co-operate with the other states concerned in programs of conservation, research and regulation.

The Conference recognized that a problem is created where there is intensive exploitation of offshore waters near to heavily fished inshore waters and that a new operation by another state may considerably affect the abundance of fish in the inshore waters. Where no conservation program is operating, over-fishing may take place before the state concerned can reach agreement on conservation measures. Regarding what conservation action should be taken by a coastal state in such circumstances, the Conference was, as the report states, " more or less evenly divided as to the responsibility of the coastal state under such circumstances to institute a conservation program for the fisheries concerned, pending negotiation of suitable arrangements. This problem requires further study. " In Section VII, paragraphs 7 and 8 deal with the difficult but very important question of the jurisdiction of the coastal state over adjacent fisheries, and read as follows :

7. It was the consensus of the Conference that it was not competent to express any opinion as to the appropriate extent of the territorial sea, the extent of the jurisdiction of the coastal state over fisheries, or the legal status of the superjacent waters of the continental shelf.
8. The question of the special interests, rights, duties and responsibilities of coastal states in the matter of the conservation of the living resources of the sea was discussed in the Conference. The opinion of the Conference on these matters, and on the question as to whether the Conference was competent to consider them was more or less evenly divided.

The report ends with two statements, one by the delegates of Peru and Chile and the other by the delegates of Ecuador. The former point out that they abstained from voting on the conclusions contained in Sections VI and VII of the final report because they considered that in some respects, the contents exceeded the competence of the Conference and because in substance they mainly reflected the trend of thought of a group in the Conference which did not hold a decisive majority (parts of Sections VI and VII deal with the problems of the coastal state, its extent of interest and responsibility, and the general conclusions).

The statement by the delegation of Ecuador records :

> The delegation of Ecuador places on record that it approves Section VI of the final report on the understanding and with the assurance that the said Section is exclusively descriptive in character and merely describes the various views held in the Conference, without making recommendations or formulating resolutions of any kind.

The statement adds that this approval

> expressly leaves unimpaired any relevant constitutional and legal dispositions adopted by the Republic of Ecuador, and any stipulations of the conventions to which it has acceded, and the unshakable attitude it has taken in defence both of the inalienable rights of coastal states and of their marine resources.

The delegation of Ecuador made the same reservation regarding Section VII of the final report and all other sections.

The printed report is available from United Nations Headquarters, New York.

SOME SIMPLE OCEANOGRAPHICAL INSTRUMENTS TO AID IN CERTAIN FORMS OF COMMERCIAL FISHING AND IN VARIOUS PROBLEMS OF FISHERIES RESEARCH[1]

Fishermen's Current Meter

At various times applications have been received from fishermen for information on currents below the surface water of fishing areas. Several reasons have been given for wanting this information. In the case of trawling on deep bottoms, it has been said that to know the direction of the deep currents would reveal the direction in which the fish were headed and that this knowledge would enable the fishermen to decide on the most effective direction of the net approach.

In the case of fishing with pelagic nets, the same point has been urged with the addition that, when using a complicated gear such as the purse seine, it would be a great manipulative advantage to know whether or not the water movement seen at the surface persisted, unchanged, down to the depth at which the fish had been echo-located. If it could be known in advance of shooting that the currents at " fish depth " were markedly different from those at the surface, it would be possible to do something to avoid entanglement of the nets.

These problems had been considered by J. Eggvin, Head of the Oceanographical Division of the Norwegian Fishery Directorate when the Lofoten (Norway) cod fishermen urged, after the 1952 winter fishing season, that some means should be made available to them to know how the water moved at fishing depth. The requirements of the fishermen were stated by Eggvin[2] in an article " Measurements of Currents Prevailing in Fishing Waters. "

[1] By J. N. Carruthers, British National Institute of Oceanography, Wormley, Surrey, England, with the collaboration of A.J.Woods, Messrs. Kelvin and Hughes, London.

[2] See *Fiskaren*, Bergen, Norway. Vol. 31, No. 20, 19 May 1954.

In the article he pointed out that the current prevailing at fish-depth often runs in a different direction from that at the surface. factor is more pronounced when fish are at depths of 90 to m. (49 to 60 fms.) than when they are between 50 and 60 m. to 33 fms.)

Eggvin and his assistants at his laboratory at Bergen, Norway, ollaboration with the Norwegian instrument-making firm, Bergen tik, devised a method of using Ekman's current meter to record ents at fishing depth. The instrument was suspended from a sub-ged buoy, which was kept "floating" at a depth great enough void most of the movement of the surface waves. The aim was et up a currents broadcasting service from a research vessel making rvations on the deep currents of the fishing grounds.

The current meter was, as stated, worked beneath an anchored -surface buoy. To this was fastened a long length of line bent small finder buoy to facilitate recovery of the gear. At first, the end of the recovery line was kept on board, loosely captive so t no pull was exerted on it, but later it was found better to set gear free for the brief periods when measurement of the currents made.

Ekman meters were specially adapted for the work. A free-ding clockwork was fitted to each meter in such a way that a ing wheel actuated it after sufficient time had been allowed to set the apparatus.

When fitted with timing wheels, the current meters can work as uired for 10 min., 15 min., 20 min., etc., and then stop. Thus, recovery, Eggvin learnt all he needed to know of current speed l direction at the several depths to which he sent his instruments, l was able to broadcast the information from the research vessel he fishing fleet. It is understood that the service has been success-and is appreciated by the fishermen.

Eggvin used a fish-shaped buoy of aluminum alloy, kept 5 m. 7 fms.) submerged and moored by a 4 mm. (0.16 in.) diameter anded wire cord attached to a 50 kg. (110 lb.) lead. The buoy s of 30 kg. (66 lb.) buoyancy.

Illustrations of the arrangements show three clockwork-controlled man meters suspended one above the other, at chosen depths, on anded wire cord made of phosphor bronze to avoid magnetic inter-ence. This latter precaution hardly seems necessary, particularly view of the present way in which the Bergen meters are used, "gim-ized" on the wire. This would seem to put a safe distance between e cable and the compasses.

While this apparatus and gear are ideal for use by a research vessel, y are not suited for use by ordinary fishing vessels, and Eggvin ed the writer to try to construct a simple current-measuring in-ument which could be used by fishermen themselves, without needing anchor their boats. In response to an invitation from the Norwegian heries Directorate, the writer studied the problem in Bergen in 53 and devised an instrument, the fisherman's current cone, which

has since undergone many modifications and has been tested in n
merous places. A description of it by A.J.Woods, who has been clos
concerned with its development to definitive form, appears as A
pendix A to this article.

Some of the most interesting work done so far with the cone
that carried out by A.J.Lee from the fisheries research vessel *Ern
Holt*, belonging to the Ministry of Agriculture and Fisheries, Unit
Kingdom.

Lee made some observations of very great interest in depths va
ing from 92 to 165 m. (50 to 90 fms.) in the area of water lying to t
southeast of a line joining Hope and Bear Islands. Without givi
details here, it can be said that over a considerable latitude spaci
the following near-bottom currents were measured :

0.6	knots	towards	220°
0.7	"	"	140°
0.65	"	"	135°
0.8	"	"	150°
0.45	"	"	50°

J.B.Tait, of Aberdeen, Scotland, in studying the water mov
ments through the Faroe-Shetland Channel and on into the Nort
and Norwegian Seas, used the cone to measure deep currents. A
observation made by him at a position 56 miles from the northern
most tip of the Shetland Islands in 148 m. (81 fms.) of water showe
a current, just off bottom, moving at 0.7 knots towards 321°.

H.Barnes of the Millport Laboratory, Isle of Cumbrae, Scotland
has also made many observations with the cone in Firth of Clyde water
He has tabulated results in a way which clearly connects speed an
direction of water movement with tide stage. In a depth of 168 m
(92 fms.), at a point off the coast of Scotland, midway between Arra
and southwest of the southern tip of Bute, Barnes made a series o
observations at 5.5 m. (3 fms.) below surface and at 5.5 m. (3 fms
above bottom. Smooth changes in speed and direction at both level
were recorded. A considerable difference in direction at the two depth
was found, and it was discovered that near-bottom currents wer
faster than those near the surface. Up to the time of writing mor
than 60 observations have been made.

D.Vaux has made observations with the cone from the researc
vessel *Sir Lancelot*, owned by the Lowestoft Fisheries Laboratory o
the United Kingdom Ministry of Agriculture and Fisheries.

The cone was tested throughout its development in the river Crouch
Essex, England, with generous assistance provided from the Burnhar
Laboratory of the Ministry of Agriculture and Fisheries. A suitabl
small ship was made available and D.Waugh of the Burnham Labo
ratory also lent his assistance.

Warp Shape Indicators Applicable to Depth and Gape Studies of Pelagic Trawls

A paper, which is to appear in a special supplement of *Deep-Sea Research* (to be issued in honor of Professor Henry Bigelow, late Head of the Woods Hole Oceanographic Institution, Woods Hole, Mass., U.S.A.), gives an account of some simple devices to measure the distribution of slope and direction along the warps on which a pelagic trawl is towed. Net experts at the Lowestoft and Aberdeen Fisheries Laboratories, United Kingdom, were consulted and accounts of work done by von Brandt and Schärfe (Germany) were read before the paper was written.

In the paper it is claimed it is easy to learn the depth at which a pelagic trawl had fished and the height above bottom that the foot rope had traveled during the tow. These facts enable an estimate to be made of the vertical gape of the net. If many comparisons are made between the over-all average warp slopes, indicating net depth, and the entry angles of the warps (as read from a deck clinometer), it may be possible to " correct " the entry angles to become better indicators of the fishing depth of the net. If this is so, then a convenient table for use by skippers could be prepared.

The devices used in making these measurements consist of jars made of heat-resisting glass, half-full of hot gelatine solution, topped up with ordinary paraffin oil (kerosene). The jars are sealed with discs of kerosene-resistant rubber and screw-on caps of aluminum. They are equipped with means to attach them to warps, ropes, or wires of any size. When slopes are being investigated, the " jelly bottles " are fixed, while hot, to the warps, and the gelatine sets after immersion in the sea, thus providing a firm interface between it and the colored oil. After hauling in, the interface slope can be measured with a clinometer. Such jelly bottles work perfectly and, re-liquified in a bath of hot water, they can be used again.

A ring compass of aircraft-type was " floated " in some of the bottles at the interface between the two hot liquids. This was easily done by suspending the compass below a tiny buoy floating in the paraffin oil. Some buoys were painted red and some green for use on port or starboard warps respectively. A record of warp slope and warp direction is obtained when the jelly sets in the jars containing compasses. If sufficient jelly bottles are fixed to each warp, it is possible to learn the mean course of both warps and the angle of separation between them. This makes possible an estimate of the horizontal gape of the trawl. A small scale test was successfully carried out in the River Crouch. Better estimates of vertical and horizontal net gape can be obtained if numerous jelly bottles are fixed to a short light line of known length towed into the trawl between head and foot lines or between the doors. A drogue of neutral buoyancy is towed into the net from the mid-point of the line. The vertical angles obtained from the bottles recording the slope of the rope reveal the vertical net

gape, while the " directional " bottles determine the wide separation angle between the two halves of a light horizontal line of known length and thus yield an estimate of horizontal gape.

In the tests carried out, transparency was no problem, but the congealed gelatine interface slopes could not always be read accurately even when using a very effective clinometer made by J. Joseph of the German Hydrographic Institute of Hamburg. The main drawback of jelly bottles is that the compasses are seldom " frozen in " on an even keel, which makes it almost impossible to decide line direction closely enough to estimate horizontal net gape.

Owing to the shortcomings of the simple jelly bottles, it was decided to make two types of rolling clinometer, housed in perspex cylinders (*see* Appendix B, p. 138). The rolling clinometers will be used in future investigations.

Acknowledgments

In addition to the thanks already expressed, the writers wish to record their indebtedness to the following in England for help: H. Barnes, Millport; D.Vaux, Lowestoft; J.F.Allan and A. Silverleaf, Ship Division of the National Physical Laboratory; F.Greenshields, Metropolitan Water Board; D.Stephenson, Messrs. Burrows and Wellcome; and R.Baird, Conway Station of the Ministry of Agriculture and Fisheries for his services in making underwater observations on the behavior of the current cone.

APPENDIX A

THE FISHERMAN'S CURRENT CONE *

Description

The fishermen's current cone (*see* frontispiece *Fig. 1*) consists of a conical casing which can vary its attitude according to the speed and direction of the water flow and has a simple mechanism for recording these factors. The cone is 242 mm. (9.5 in.) diameter and 600 mm. (24 in.) long. Its weight in air is 2,950 g. (6.5 lb.) and in water 2,070 g. (4.5 lb.), including the device which clamps round the rope and supports the meter.

The conical casing is made of perforated aluminum coated with plastic for protection against the corrosive properties of sea water. The cone is swung in trunnions at the end of a fork mounting which is free to move around the supporting rope. The axle going through the fork and cone is bushed with a new plastic " PTFE " (Polytetrafluorethylene) which has an extremely low coefficient of friction and allows the cone to take up the correct tilt according to the water speed.

* Kelvin and Hughes, licensees of covering patents.

The fork terminates in two twisted ends as shown in *Fig. 1.* The rope is easily inserted into the center of the helices. The upper helix has a forked end partly surrounding the rope and bearing on the top of the rope clamp, made of two halves hinged together and attachable to the rope without tools. It can clamp on rope up to 60 mm. (2.35 in.) circumference and will also take stranded wire down to 5 mm. (0.197 in.) diameter.

The mechanism for recording the speed and direction of the current is seen in *Figs. 2* and *3*. It is made of an aluminum alloy specially resistant to the corrosive effects of sea water. A pendulum is swung on an axis in PTFE bushes and remains upright. The angle between the pendulum and the axis of the cone is a measure of the speed of the water current. A scale of speed in knots is provided on the quadrant seen in the illustrations. In the base of the pendulum is a compass card which, being always in a horizontal plane, takes up a constant direction with respect to the earth's magnetic field. The angle between the north to south line in this card, and the axis of the cone, gives the direction in which the water is flowing.

Figure 2. The fishermen's current cone with tablet inserted before immersion. The pendulum and compass card are free to swing.

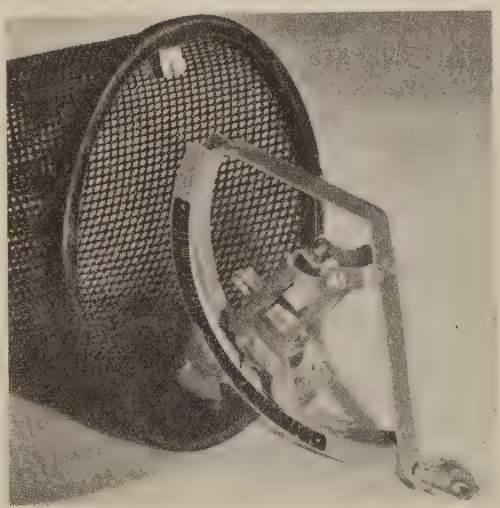

Figure 3. The fishermen's current cone with mechanism swung out for taking the reading after recovery from the sea. The pendulum and compass are now clamped and the reading is 0.65 knots flowing to 240° magnetic.

The method of locking the mechanism to preserve the readings is very simple and reliable. A spring clamps the compass card between

two fixed rubber rings and a prong projects through the base of the pendulum into a strip of sponge rubber which lines the quadrant holding the speed scale. This locks the pendulum and preserves the speed reading. It is only necessary to compress the clamping spring to set free the compass card and the pendulum. The spring is, therefore, compressed before immersing the meter and a soluble tablet is inserted in a little fork to hold the spring compressed. When the tablet dissolves the spring is released and the pendulum and compass card are clamped again.

Tablets

At present the tablets consist of potassium iodide highly compressed with 0.25% of magnesium stearate and are $^5/_8$ inch (16 mm.) diam. and $^1/_2$ inch (12.7 mm.) high. They take from 15 to 20 minutes to dissolve, less if the water is warm. Work is continuing to produce less expensive tablets which will dissolve a little more quickly.

Calibration

The speed scale was derived from readings taken at the National Physical Laboratory (NPL), Teddington, England.

Competence

The scale covers the range from 0.10 to 3.0 knots. The lower limit is fixed by the slowest current giving a measurable tilt of the cone. The upper limit comes when the cone approaches the horizontal position and the scale graduations become too crowded.

Method of Use

It is suggested that the easiest method might be to drop overboard a suitable rig at the place where the fish have been echo-located. For use in this way, a rope, rather longer than the depth of the water, is prepared with a light anchor of about 11.3 kg. (25 lb.) secured to the end. The rope clamp and the cone are fixed to the rope at a depth where the fish have been found. Several trawl floats are fixed to the upper part of the rope. They are submerged. A light line is fixed to the top end of the rope and is fastened to a marker float. If this light line has two floats, separated, it will help the recovery of the gear by showing the direction of streaming. All this gear is dropped into the water and left for, say, 20 minutes before it is recovered and the reading is taken. Enough floats must be used to keep a minimum tension on the lowest end of the rope of 4.5 to 6.8 kg. (10 to 15 lb.) If too many floats are used, they will be caught by the current and, pressed downstream, will give an excessive slope to the rope. Again, if there are too many floats, the anchor may drag, even if the floats are insufficient to lift it in still water. Steel balls, with a 200 mm. (8 in.) diameter, such as Phillips' "North Sea" balls, have a buoyancy of about 2.83 kg. (6.25 lb.) each. As the cone and rope clamp weigh 2.03 kg. (4.50 lb.) in water, three such balls give a tension of

6.35 kg. (14 lb.) on the rope below the cone, which is satisfactory with an anchor weighing 11.34 kg. (25 lb.) A weight can be used instead of an anchor, but it would have to be much heavier to give the same holding power. If current measurements are required simultaneously at several depths, it is easy to use several cones at once on the same rope. The minimum tension at the bottom of the rope should be 4.5 to 6.8 kg. (10 to 15 lb.) This will avoid any possibility of a cone, placed very low down the rope, lying on the bottom instead of hanging free. If it is required to make measurements at heights 2.3 and 9.1 m. (1.3 and 5 fms.) off the bottom and the total depth is 18.3 m. (10 fms.), a rope 22 m. (12 fms.) long should have a 11.34 kg. (25 lb.) anchor made fast to one end and a cluster of five 20 cm. (8 in.) North Sea balls fixed at 14.6 m. (8 fms.) from the anchor. The rope clamps with cones are attached to the rope at 2.3 and 9.1 m. (1.3 and 5 fms.) from the anchor, and a light line, about 18 m. (10 fms.) long, is made fast to the free end of the rope. A single 20 cm. (8 in.) ball is tied to the free end of the light line and, if desired, another 5.5 m. (3 fms.) down from the free end. Such a rig is satisfactory for currents up to about 1.5 knots. In stronger currents, a weight should be added to the rope above the anchor and the heights measured from this weight, which will lie on the bottom.

It is possible, despite the precautions taken, that the anchor may go into a hole and the cone foul a rock. Should this happen, the reading obtained will immediately be suspect because, in these conditions, the cone will be nearly horizontal, and will give a reading at the top of its speed range or, if it lies on its back on the bottom, the reading will be the wrong side of zero. To be sure of the height of the cone from the bottom, a method of measuring the slope is desirable.

Rope Angle Gauge

The rope angle gauge, shown in *Fig. 4*, was constructed for this purpose. It is fixed to the rope by the same method as is used for the cone and uses the same rope clamp. The gauge consists of a pendulum suspended between two leaves of transparent plastic. The clamping force comes from two springs enclosed in the bosses at top and bottom. These are operated by placing a tablet, as used for the cone, in each boss. The perforated screw cap is replaced and the clamping springs are then compressed, the plastic leaves forced apart and the pendulum allowed to

Figure 4. The rope angle gauge.

swing freely. When the tablets are dissolved, the pendulum becomes again clamped and the angle between the vertical and the rope is read off a circular scale of degrees engraved on one of the transparent plastic leaves. The over-all length of the rope gauge is 920 mm. (36 in.) The book part of it is 300 mm. × 330 mm. (12 in. × 13 in.). Its weight is 2,150 g. (4.75 lb.) in air, and 1,360 g. (3 lb.) in water.

The rope angle gauge will give the best average slope if it is attached midway between the anchor and the cone.

APPENDIX B

THE PERSPEX-CASED ROLLING CLINOMETER *

The soluble tablet used with the rope angle gauge is replaced in the clinometer by the solidification of a gelatine solution. Two forms of clinometer have been constructed, one with and one without a compass. The former gives direction as well as slope. Both instruments consist of a perspex tube 6 mm. (0.25 in.) thick and 100 mm. (4 in.) outside diameter, with an end of 12 mm. (0.50 in.) thick perspex cemented in place. An end plate with two filling plugs is fitted on each. The perspex tube has a wooden or Tufnol rod with short cross pieces for attaching it to the rope by strong rubber bands looped over a peg, then stretched several times round the rod and the rope, and finally slipped again over the end of another peg.

The simpler of the two clinometers is shown in *Figs. 5* and *6*. Two brass plates, one bearing a circular scale of degrees, are joined to

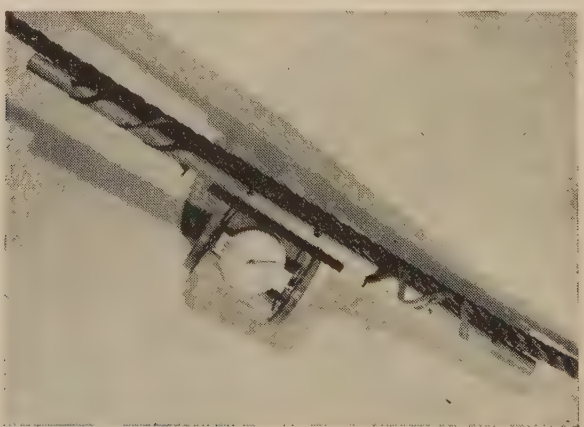

Figure 5. The simple clinometer for measuring the slope of a rope. In this case the rope makes an angle of 57° to the horizontal.

* Kelvin and Hughes, licensees of covering patents.

form a frame, pivoted to revolve about the axis of the perspex tube. A little pendulum with a heavy weight is free to revolve about an axis perpendicular to the perspex tube and through the center of the circular scale. Attached to the pendulum axle is a wire pointer against which the scale division gives the slope of the rope. As the pendulum swings on a frame, which is itself able to revolve about the axis of the perspex tube, it follows that the pendulum will always hang vertically. The tube will always be parallel to the rope and the rope angle can be read on the scale whether the tube is below, above or to the side, or, in fact, twisting round the rope.

The clinometer is filled with a 12 1/2 % gelatine solution, which is not perfectly transparent, but is sufficiently clear for the reading to be taken. When about to be used, the clinometer is plunged into a bucket of hot water and kept at about 60° C. (140° F.) until the gelatine solution

Figure 6. The simple rope angle clinometer shown filled with water. The method of fixing to the rod is shown, also the filling plugs through which the gelatine solution is poured in.

is liquified, then the gauge is fixed on the rope with rubber bands. After about half-an-hour, the rope is hauled in. By that time the gelatine will be set, thus recording the rope slope. Experiments are going on to prolong the setting time by cork-jacketing the perspex tube. The simple clinometer weighs 1,730 g. (3.8 lb.) in air and 340 g. (0.75 lb.) in water. The length of the stick is 685 mm. (27 in.) and the length of the perspex tube is 140 mm. (5.5 in.)

Clinometer with Compass

A clinometer, with a compass mounted in its pendulum, has been made for measuring the horizontal gape of a trawl, so that the direction of a rope in azimuth, as well as its slope, can be determined. This clinometer is shown in *Figs. 7* and *8*. The compass, which is pivoted in the pendulum, is always in a horizontal plane and free to take up its correct orientation in the earth's magnetic field. The frame, in which the pendulum swings, is provided with two weights compelling it into the vertical plane, and is made of perspex so that the compass can be read through it. One perspex plate is provided with a semi-circular scale of degrees against which a mark on the pendulum gives the slope of the rope or warp. The graduations have 90° marked in red and 90° in blue to help in determining which direction the rope is sloping with respect to the ship and to the compass. A lubber line, painted red,

Figure 7. The rope angle clinometer with compass (filled with water) is shown attached to the rope with elastic bands. The reading in this case shows that the rope is at 58° to the horizontal. The compass reading of 130° from the lubber's line at the side shows that the rope running towards the ship bears 130 - 90° = 40° magnetic.

is provided for reading the compass card, which is graduated every 10° and can easily be read to a third of this. The compass is the same type as that used in an aircraft. The weight of the clinometer, with the compass, is 2,610 g. (5.75 lb.) in air and 725 g. (1.6 lb.) in water, and the length of the perspex tube is 190 mm. (7.5. in.)

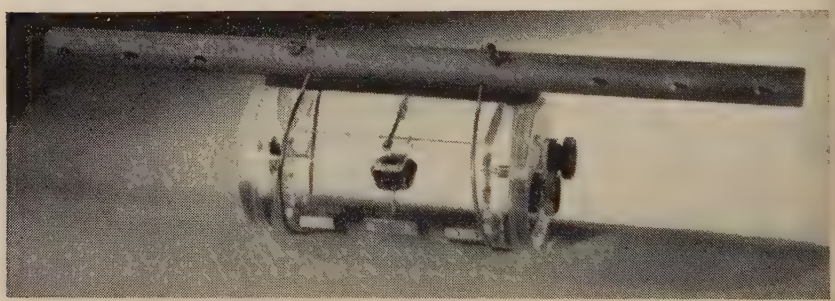

Figure 8. The rope angle clinometer with compass. This view shows the compass card pivoted inside the pendulum. The pendulum is swung between the transparent side plates one of which bears the slope scale. The pivots of the frame and its brass weights at the bottom can be seen.

Thanks to facilities kindly provided from the Marine Laboratory of the Scottish Home Department, Aberdeen, Scotland, a sea test of the clinometers *Figs. 5* to *8* has been made from the research vessel *Clupea*. Their functioning is highly satisfactory, and warp slopes were easily measured with precision for the points of attachment. Preliminary experiments were made on warp divergence, but more instruments than have yet been made are declared necessary by B. Parrish who was in charge of the cruise in which A.J.Woods took part.

HYDROBIOLOGICAL RESEARCH COUNCIL ESTABLISHED IN PERU

The following Supreme Resolution was issued on 24 November 1954 by the Government of Peru :

In view of the need to co-ordinate and intensify hydrobiological studies for a better utilization and control of the natural resources ; and bearing in mind that various state organizations are at present engaged in this type of research ; *it is hereby resolved* :

1. to establish a Co-ordinating Council to be named HYDROBIOLOGICAL RESEARCH COUNCIL whose members will be : a representative of the Ministry of the Navy, who will preside ; a representative of the Ministry of Agriculture ; a representative of the Treasury ; a representative of the National Society of Fisheries. Other national or foreign members may also be included when the Council considers it necessary. This Council will be responsible for the co-ordination, revision and approval of the plans and programs for hydrobiological scientific research.
2. to appoint an ADVISORY SCIENTIFIC COMMITTEE, attached to the Hydrobiological Research Council, consisting of the following members : a representative of the Oceanographic Department of the Navy ; a representative of the Fisheries Research Department of the Fisheries Administration ; a representative of the Technical Department of the Guano Company ; a representative of the Point Four Technical Personnel. Representatives of national or foreign technical organizations may also be included as the Council sees fit. The Advisory Scientific Committee will be responsible for the preparation and carrying out of the research plans and programs, after their revision by the Hydrobiological Research Council.

Conferences and Meetings

UNESCO International Advisory Committee on Marine Sciences

A meeting of experts, to consider the terms of reference and mode of operation of a proposed UNESCO International Advisory Committee on Marine Sciences took place at FAO Headquarters, Rome, Italy, on 9 and 10 May 1955.

The following experts, invited by UNESCO, attended :

AUSTRALIA — D.J. ROCHFORD of the Marine Biological Laboratory, CSIRO Division of Fisheries, Cronulla, and President of the Technical Committee of the Indo-Pacific Fisheries Council to study the oceanography of the region.

Denmark	A.F. Bruun, Director of the Museum of Zoology, University of Copenhagen, and President of the Committee of the International Council of Scientific Unions to study oceanographic problems common to the International Union of Geodesy and Geophysics (IUGG) and the International Union of Biological Sciences (IUBS).
	A.V. Tåning, Director, Danish Institute for Fisheries and Marine Research Charlottenlund.
France	G. Laclavère, Secretary-General of the IUGG and member of the Special Committee of the International Geophysical Year (IGY).
	P. Tchernia, Scientific Advisor to the Etat-major général de la Marine, Paris.
Japan	M. Fujinaga, Chief, Research Section, Fisheries Agency, Tokyo.
	K. Hidaka, Professor of Physical Oceanography, University of Tokyo.
Mexico	J.A. del Villar, Chief, Commission for Rural Fish Culture, Department of Fisheries.
Netherlands	P. Groen, Director of the Netherlands Meteorological Institute, De Bilt.
Norway	H. Mosby, Director, Geophysical Institute, Bergen, and President of the International Association of Physical Oceanography of the IUGG, representing the IUGG.
	H.U. Sverdrup, Director of the Norwegian Polar Institute, Oslo, and Vice-President of the International Council for the Exploration of the Sea.
Sweden	F. Koczy (representing H. Pettersson), Director of the Institute of Oceanography, Göteborg.
United Kingdom	J.B. Tait, Chief of the Section of Hydrobiology at the Marine Laboratory of the Scottish Home Department, Aberdeen.
United States of America	A.A. Buzzati-Traverso, Professor of Biology at Scripps Institution of Oceanography, La Jolla.
	M.B. Schaefer, Director of the Inter-American Tropical Tuna Commission, representing R. Revelle, Director of the Scripps Institution of Oceanography.
U.S.S.R.	L.A. Zenkevich, of the Academy of Sciences of the U.S.S.R., and Head of the Department of Invertebrate Zoology, Moscow University, Moscow.

The observers present were J. Reymond, Minister Plenipotentiary of the Principality of Monaco, G. Belloc, Assistant Director of the Institute of Oceanography, Principality of Monaco, and S.R. Galler of the U.S.A. D.B.Finn and G.L.Kesteven attended on behalf of FAO;

UNESCO was represented by P. Auger, Director of the Department of Natural Sciences, who acted as chairman of the meeting, and by M. Yoshia and W. Moller.

It was agreed :

that the functions of the International Advisory Committee on Marine Sciences shall consist in advising the Director-General of UNESCO on the promotion of international collaboration in the marine sciences, and in the preparation and execution of marine science research projects within the program of the Organization, with a view to augmenting fundamental scientific knowledge as such, and to gathering and co-ordinating scientific information intended for application in improving the living conditions of mankind ;

that the Committee shall be composed of 9 members, appointed by the Director-General, and chosen from among the members of international panels of honorary consultants, set up by UNESCO in consultation with FAO, on the marine sciences, in such a way so that there will be representation of each branch of the marine sciences, and of each of the oceanic regions ;

that the International Council of Scientific Unions, the International Union of Geodesy and Geophysics, the International Union of Biological Sciences, the International Union for the Protection of Nature, the Associations of Hydrology and of Physical Oceanography of the IUGG, the Association of Limnology, and (when established) the Association of Marine Biology of the IUBS, shall be invited by the Director-General to send observers to the sessions of the Committee ;

that FAO shall act as a liaison body between its regional fishery councils and commissions and the Committee. Regional organizations concerned with the exploration of the sea and having independent status may be invited by the Director-General to send observers to the sessions of the Committee.

The Committee shall be convened by the Director-General, and shall meet at least once a year.

A list of 30 names was prepared by the experts present at the meeting from which the Director-General of UNESCO might choose the members of the Advisory Committee.

The first meeting of the Committee will be held in Tokyo, Japan, in the autumn of 1955. The following topics have been suggested for the symposium :

1. discussion of problems related to kinds of physical, chemical and geological data which have bearing on the biological resources of the Pacific Ocean ;
2. exchange of information concerning the latest developments in the field of oceanographic instrumentation, as well as co-ordination in establishing efficient and reliable standard instruments and procedures in oceanographic measurements.
3. exchange of information concerning available and needed oceanographical data.

International Union of Biological Sciences (IUBS)

The XII General Assembly was held in Rome, Italy, from 12 to 16 April 1955 under the chairmanship of Prof. S. Hörstadius (Sweden). Delegates attended from Belgium, Canada, Czechoslovakia, Denmark, Egypt, France, Western Germany, India, Israel, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, the Union of South Africa, the United Kingdom, the U.S.A. and Yugoslavia.

The General Secretary, Prof. G. Montalenti (Italy), reported on the last meeting of the IUBS, held in Nice, France, in August 1953, and outlined the scope of the present assembly. At Nice, a re-organization of the IUBS was proposed and a Policy Board of 7 members was elected.

The following points were included in the program prepared by the Bureau of the IUBS, in co-operation with the Policy Board:

1. reorganization of the IUBS structure in order to obtain a more practical and organic subdivision, and to ensure a more intensive national representation;
2. consideration of a more precise definition of the scope of the IUBS.

The following tentative scheme for sections was also presented:

Union	*Division*	*Section*
International Union of Biological Sciences	Plant Biology (Botany)	1. General
		2. Taxonomy
		3. Structural
		4. Functional
		5. Geobotany
		6. Phytopathology
		7. Paleobotany
		8. History
	Animal Biology (Zoology)	1. Zoology
		2. Entomology
		3. Embriology
		4. (Ecology)
	General Biology	1. Cell Biology
		2. Biometry
		3. Microbiology
		4. Genetics
		5. Limnology
		6. Experimental Psychology
		7. (Thalassology, Marine Biology)*
		8. (Ecology)
International Union of Biochemistry		Biochemistry
International Union of Physiology		Physiology

* At the meeting of Marine Biological Laboratories, (*see* pp. 146/7) it was decided that an independent Committee of Marine Biology should be founded which would later apply for incorporation into the International Union of Biological Sciences.

In order to give a basis for discussion on the second point in the program, a " Symposium on Topics of International Concern in the Life Sciences " was planned for the General Assembly.

" Standards, Units, Symbols and Terms " was the first topic of the Symposium to be discussed and A. Frey-Wyssling (Switzerland) stressed the importance of promotion of unification of standards, units, symbols and terms and of a strict application of the decimal system in biological papers, to facilitate international co-operation in research. J. Burn (U.K.) reported on the progress made in the standardization of biological units by international agreements, and H. Hardorn (Switzerland) illustrated, using genetic terminology, how well an international agreement on terms can be achieved.

Among the points raised on " Research Organizations and Support, " R.E. Cleland (U.S.A.) criticized the present practice of supporting research and research workers in the U. S. A. He suggested that more emphasis should be laid on support for ' pure scientific projects ' on a more intense international co-operation in research. B. Rajewski (W. Germany) explained the function of the Max Planck Association in academic research and teaching, the principle being to create facilities for individual outstanding workers. However, this Association is able to work effectively only in large countries with a certain minimum number of institutes.

W.Ankel (W. Germany), P. Raven (Netherlands) and P. Weiss (U.S.A.) lectured on " Teaching and Training, " and they underlined the importance of stimulating the student effort towards a broader education and interest in science and art, to counterbalance the highly specialized teaching nowadays. This, as. Ankel pointed out, could not be achieved by force but rather by encouraging teachers of specialized subjects to lead their students to a greater interest and understanding.

On " Publications " M.J. Sirks (Netherlands), P. Rosbaud (U.K.) and H. Bentley Glass (U.S.A.) stressed the great need for reorganizing the present system of publication. It was agreed that papers of a higher standard can be obtained only by the better editing of the journals in which they appear. Reviews and abstracting publications covering a wide selection of journals were important.

Under " Supplies and Depositories, " N. van Staelen (Belgium), J. Westerdijk (Netherlands) and H. Matthews (U.K.) spoke on various collections of animal and plant cultures and they suggested that the IUBS should consider the possibility of distributing information on available material and of maintaining the collections.

P. Chouard (France), under " International Congresses and Conferences " spoke on his experience in organizing the International Congress of Botany (Paris, 1954), and G. de Beer (U.K.) expounded on the preparations for the forthcoming International Congress of Zoology, to be held in London in the summer of 1958. This Congress should be grouped under " Topics " to ensure a closer connection between the papers presented.

Summarizing, J. Rünnström (Sweden) pointed out that international congresses lend valuable support to international co-operation

by giving scientists an opportunity for personal contact. To this end, participants should be invited from widely different fields of study, while symposia and colloquia should be organized on a restricted and well defined subject.

Under the topic "International Co-operative Projects," B. Rensch suggested in his paper, which was read in his absence, that the IUBS should aim to further opportunities for personal international contact, especially in fields such as marine biology and biology of polar deserts and arid regions, where scientific material can be gathered only by international co-operations. He suggested that there should be an intensive international exchange of scientists. R.W. Hiatt (Hawaii) also felt that the need for close international collaboration between marine biologists was important since marine problems, by their very nature, could be approached effectively only on an international basis. Regarding the taxonomy of fishes, he referred to the proposal of Prof. Bolin, Stanford University, U.S.A., for international co-operation.

Hiatt made five further suggestions :

(*a*) organization of an international register of marine genetical standardized specimens ;

(*b*) international co-operation on the fluctuations in the inorganic and non-living organic marine environment and in the abundance and distribution of organisms ;

(*c*) international study of major ocean currents ;

(*d*) studies on pelagic plankton populations ;

(*e*) standardization of plankton methods.

In conclusion, Mr. Hiatt proposed the establishment of a paid international secretary of marine biology whose duty it would be to maintain contact between the workers in the marine sciences.

Many of the proposals put in the Symposium have been adopted by the General Assembly or will, in future, guide the activity of the Executive Committee of the Union.

International Conference on Marine Biological Laboratories

Under the sponsorship of the International Union of Biological Sciences, an International Conference on Marine Biological Laboratories took place in Rome, Italy, from 18 to 22 April 1955. The official participants were :

CANADA	J.L. Hart	Atlantic Biological Station, St. Andrews, N.B.
DENMARK	G. Thorson	Zoological Museum, Copenhagen.
EGYPT	H.A.F. Gohar	Marine Biological Station, Fouad I University, Al Chardaqa, Red Sea.
FRANCE	P. Drach	Zoological Laboratory, University of Paris
	L. Fage	Zoological Laboratory, National Museum of Natural History, Paris.
GERMANY, WESTERN	A. Bückmann	Institute of Fishery Biology, University of Hamburg.

Hawaii	R.W. Hiatt	Hawaii Marine Laboratory, University of Hawaii.
Italy	R. Dohrn	Zoological Station, Naples
Japan	D. Miyadi	Seto Marine Biological Laboratory, Sirahama, Wakayama-ken.
Norway	H. Brattström	University of Bergen.
Sweden	J. Runnström	Wenner-Gren Institute for Experimental Biology, University of Stockholm.
United Kingdom	F.S. Russel	The Laboratory, Plymouth.
	Ch.M. Yonge	Zoology Department, University of Glasgow, Scotland
U.S.A.	P.B. Armstrong	Marine Biological Laboratory, Woods Hole, Mass.
	L.P. Blinks	National Sciences Foundation, Washington, D.C.
	C.L. Hubbs	Scripps Institution of Oceanography, La Jolla, Cal.
Yugoslavia	T. Soljan	Oceanographic Institute, Split.

In his introduction, the Chairman, Mr. R. W. Hiatt (Hawaii), underlined the close co-operation between the different marine biological stations, and suggested that an international organization of directors of marine laboratories should be founded. The introduction was followed by a world survey on marine biological laboratories.

The meeting discussed the relationship between marine biological laboratories, marine sciences and fishery ; their function in academic teaching, in the dissemination of marine biological information, and in the international exchange of scientific personnel ; and the questions of financial support, the requisition of expensive equipment, and engineering problems which confront directors of marine biological laboratories.

The conference emphasized the importance of a further increase in marine biological teaching and basic marine biological research. In this respect the meeting learned that a number of new stations are planned or are already under construction, namely : the Marine Biological Station, Helsingør, University of Copenhagen, Denmark ; Biologische Anstalt Helgoland, German Federal Government, Ministry of Food, Agriculture and Forestry ; Institut d'étude maritimes d'Ostende, Ministry of Agriculture, Belgium ; Marine Laboratory at Singapore, Colonial Fisheries Advisory Committee of Great Britain ; a Japanese laboratory on the Island of Hadijo, Bonin Islands, another at Nossibé, Madagascar, and the Marine Biological Station, Suez, Egypt.

The conference considered it very desirable that an international organization of directors of marine biological laboratories should be formed and an interim committee was elected to undertake the necessary steps in forming such an organization. The members elected were : A.A. Buzzati-Traverso (U. S. A.), L. Fage (France), R.W. Hiatt (Hawaii) and F. S.Russel (U.K).

International Commission for the Northwest Atlantic Fisheries[1]

The 5th Meeting of the International Commission for the Northwest Atlantic Fisheries took place in Ottawa, Canada, from 6 to 11 June 1955. The session was opened by the prime Minister of Canada, the Hon. Louis St. Laurent and the Minister of Fisheries, Mr. James Sinclair. The meeting was presided over by Dr. Stewart Bates, and was attended by commissioners from Canada, Denmark, France, Italy, Norway, Portugal, Spain, the United Kingdom, the U. S. A., and by an observer from Western Germany. There were observers representing the International Council for the Exploration of the Sea, the International Fisheries Convention 1946, the International North Pacific Fisheries Commission, the International Pacific Halibut Commission, the Special Committee of the International Geophysical Year, and FAO.

The Commission had before it research reports from Canada, Denmark, France, Iceland, Norway, Portugal, Spain, the United Kingdom, and the U. S. A., and a report on German fisheries and fisheries researches in West Greenland waters. There were also reports from the Scientific Advisers to Panels[2] 3, 4 and 5, who had met at St. Andrews in December 1954, St. Johns in March 1955, and Ottawa in June 1955.

The Secretariat presented a summary of 1954 landings of ground fish from the Convention area, a list of fishing vessels operating in that area, a compilation of research reports, a report on the United Nations International Technical Conference on the Conservation of the Living Resources of the Sea, at which the Commission was represented by the Executive Secretary, and an administrative report.

It was noted that Iceland carried out considerable fishing in Subarea 1, and the members of Panel 1 expressed the wish that Iceland should become a member of that Panel. Hydrographic work in this area was reviewed and it was recommended that the Executive Secretary should establish contact with the United States Ice Patrol Service. Special discussions took place on the halibut fishery, and recommendations were made for the continuance of research on the age, migrations, and life of the pelagic stage of this species.

Some decreases in landings of cod in Sub-area 2 were reported. Panel 2 recommended, and the Commission agreed, that there should be established a group of scientific advisers to the Panel, and that the scientific advisers to Panel 3 should act in this capacity.

The Panels for Sub-area 3, 4 and 5 had before them the extensive documentation from the meetings of their scientific advisers, and research reports from various member countries. Some decline in catches was noted. It was considered that further development of the regulation of fisheries in these areas was necessary and draft regulations were prepared and adopted by the Commission, providing that a mesh of 4 in. should be specified for the taking of cod and haddock in

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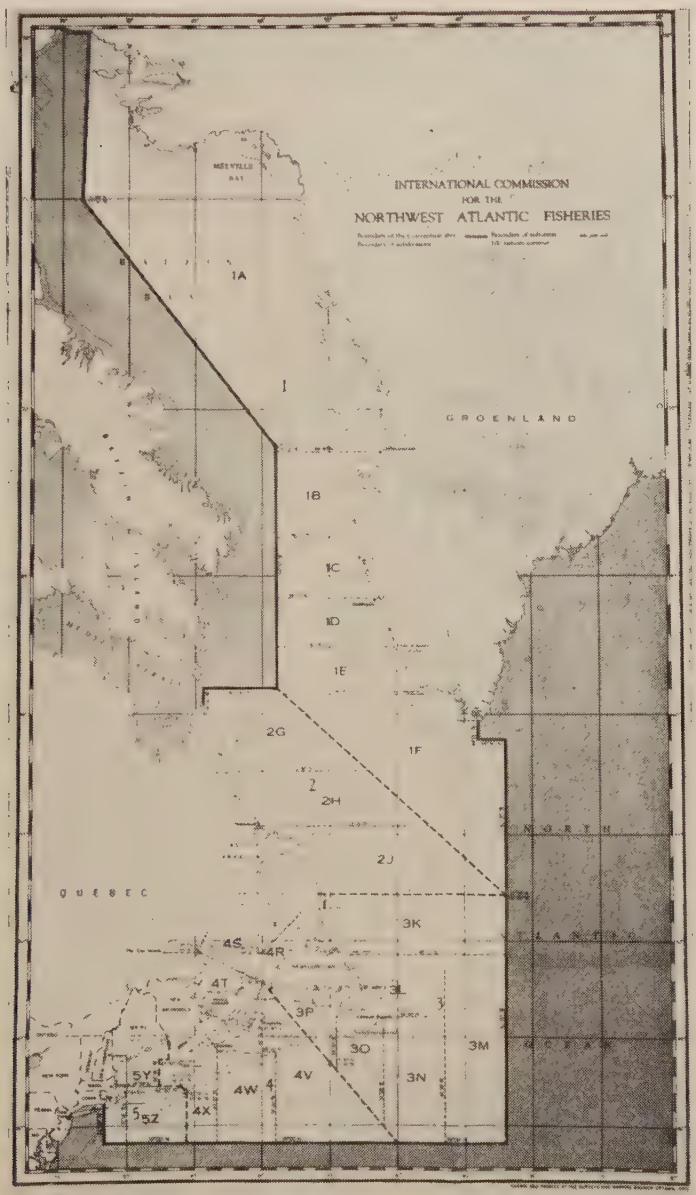
[1] See *FAO Fisheries Bulletin*, IV (1/2), 36-39 ; V (5), 196-197 ; VI (1/2), 37 ; VI (4), 124-129 ; VII (4), 175-118.

[2] These panels are committees to advise on commission activities in the corresponding sub-areas (*see* map opposite).

Sub-area 3, a mesh of 4½ in. in Sub-area 4, and that the existing mesh limit of 4½ in. for Sub-area 5 should apply to cod as well as haddock in that sub-area.



Map showing areas and sub-areas of activities in the Northwest Atlantic.

The Standing Committee on Research and Statistics made recommendations for the improvement of the compilation and publication of statistical information. It was recommended :

1. that the Secretariat request that in addition to present statistical requirements, governments submit summary statistics on landings of all species by sub-areas ;
2. that the Secretariat publish summary tables of total landings by species and by sub-areas ;
3. that wherever possible statistics of landings by gear and effort be submitted and published by months and by subdivisions.

FAO was represented by Dr. G.L. Kesteven who, on behalf of the Organization, presented a paper on resources survey work in the ICNAF area, prepared by himself and S. J. Holt. This paper was reported upon by a working party of the Standing Committee for Research and Statistics, which endorsed the general principles contained in it, and recommended courses of action to be followed by ICNAF in collaborating with FAO in the resources survey work.

The Committee proposed a mid-year meeting, to be convened in Biarritz, France, in March 1956. At this meeting the Committee will discuss the problem of sampling oceanic stocks which are partly demersal and partly pelagic, and various questions of technique and policy, and will make a special study of the characteristics of the catches of the salt fish fleet.

The 6th meeting of the Commission will take place in 1956 at Halifax, Canada. The Commission has, however, proposed an amendment to its Convention that would permit the holding of annual meetings in countries outside North America.

Symposium on Man's Role in Changing the Face of the Earth

An international symposium on Man's Role in Changing the Face of the Earth was held from 16 to 22 June at Princeton, New Jersey, U. S. A., under the sponsorship of the Wenner-Gren Foundation for Anthropological Research [see *Science*, 121 (3141), 356-357].

Subjects of fisheries interest discussed, and papers presented, were :

Man's Impact on the Sea

Michael Graham	" Harvests of the Seas "
John H. Davis	" Influences of Man upon Coastlines "
Lester E. Klimm	" Man's Ports and Channels "

Changes in the Water Economy

Harold E. Thomas	" Changes in Quantities and Qualities of Ground and Surface Waters "

ology of Wastes

John C. Bugher — "Effects of Fissioned Materials on Air, Soil, Water and Living Species"

Background papers prepared for the symposium and the discussions to be published in one volume by the University of Chicago Press.

onferences and Meetings

Calendar for 1955/56 - Revisions

1955

y	9	UNESCO International Advisory Committee on Marine Sciences	Rome
ıe	20	FAO Regional Consultation on the Selective Expansion of Agricultural Production and Consumption	Kandy
	20	South Pacific Commission - 7th Meeting of Research Council	Noumea (New Caledonia)
y	23	Pan-American Institute of Geography and History - 6th General Assembly	Mexico City
ptember	13	Permanent Commission of the International Fisheries Convention	London
"	25	Caribbean Fisheries Seminar - 2nd (Caribbean Commission)	Port-au-Spain
"	26	Meeting of representatives of Latin American marine biological laboratories, and Symposium on Plankton, UNESCO	Santos
tober	17	Meeting of representatives of marine science institutes in the Indo-Pacific Region, UNESCO	Tokyo
"	19	International Advisory Committee on Marine Sciences, Symposium on Physical Oceanography, UNESCO	Tokyo
"	24	Interim International Advisory Committee on Marine Sciences, UNESCO	Tokyo
"	25	International Permanent Committee on Canned Foods (CIPC)	Bordeaux

1956

arch		ICNAF Committee on Research and Statistics	Biarritz
		13th Limnological Congress	Helsinki
ly	27	ICNAF 6th Meeting	Halifax

Training Centers

1955

ugust/ tober	28/ 8	FAO/ETAP International Trainng Center for Fishery Administrators	Copenhagen
tober/ cember	31/ 10	FAO/ETAP International Inland Fisheries Training Center	Djakarta/ Bogor

1956

nuary	1	FAO/ETAP Training Center for Master Fishermen	Noumea (New Caledonia)
"	31	Gulf and Caribbean Fisheries Institute - 8th Annual Meeting	Miami

Fisheries Division Activities

Program of Work - Technology Branch

It is the task of the Technology Branch of the Fisheries Divisio to advise and assist fisheries administrations of FAO Member Gover ments in their endeavors to overcome obstacles to the proper develo ment of fisheries industries. As pointed out in a previous issue,* spite of abundant resources, such development is often limited technological factors such as the nature and amount of equipme available for fishing, the facilities for landing, handling, processing a distributing the catches ; as well as the lack of technical skills require in any one or in all phases of the industry.

It is obvious that the field of fisheries technology in its fulle sense is a very wide one, for it embraces all the physical activities fro the search for and capture of fish, right through to their presentatio in acceptable form and quality, to the consumer. Thus, it involv many professions including the civil engineers who design a construct fish harbors, the naval architects and boat builders, the gea technologists and gear manufacturers, and the food technologists wh deal with the many different ways and means by which fish are handle and processed, stored and distributed.

It is logical then that the work of the Branch should be divide into distinct sections, one dealing with fishing boats and harbors, on with fishing gear and methods, and one with fish handling and proces ing equipment and methods.

There is, in addition, a Branch unit which serves the entire fiel of fisheries technology, to help fulfill in this sphere one of FAO's con stitutional obligations, namely, the collection, analysis and dissemina tion of information. This is achieved mainly through the publicatio of the *World Fisheries Abstracts*, a bi-monthly periodical, now in it sixth volume, printed in English, French and Spanish, containing sum maries of the most important articles appearing in current literatur and covering the whole field of fisheries technology. This involves th continual reviewing of some 200 trade and technical periodicals an scientific and government publications from 31 countries, the selectio of suitable articles, the preparation of abstracts by staff members an outside abstractors, and the translations of the English manuscrip into French and Spanish or *vice versa*. As a result of the latter task dictionaries for fisheries technological terms in these languages hav been compiled and will be published in due course in consultation wit UNESCO and ISO. It is hoped that these dictionaries will make a

* See *FAO Fisheries Bulletin*, VIII (2), 95.

stantial contribution to the international standardization of termi-ogy in fisheries technology.

The *World Fisheries Abstracts* is printed in such a way that the in-idual abstracts may be cut and filed for ready reference by subject tter or classification codes. This cumulative collection of informa-n is widely used by fisheries research workers, fisheries educational l governmental institutions, and by fisheries technologists engaged the wide variety of occupations which, as a whole, make up the ing industries.

As a service to fisheries administrations and workers everywhere, Branch has also collected information on documentary films in whole field of fisheries science and published, in 1953, an annotated containing data on some 185 films. Information on new films continuously being added to the collection, and a revised and aug-nted list will be issued later in 1955.

shing Boats and Harbors

It has been estimated that the largest, single collective investment the fishing industry is in its floating equipment, the instruments ncerned with the primary exploitation of aquatic food resources. Fish-g boats vary from primitive log rafts, the "Catamarans" of India d Ceylon, and dug-out canoes on the one hand, to super-trawlers, na clippers, and factory ships on the other. While relatively much ort is devoted to the design of large fishing vessels, little has been ne for the smaller boats. Thus, there is a continual need in all coun-es for information on improvement of existing local designs and nstruction, and on foreign designs and types of boats that may be troduced advantageously to replace more primitive and less effi-nt local types. The work of this Section of the Branch is carried t in various ways. As already mentioned, technical journals on val architecture and fisheries periodicals are regularly reviewed and portant articles abstracted, usually including illustrations of plans profiles, in the *World Fisheries Abstracts.*

Through visits to member countries, direct advisory work is car-ed out in the field, and contacts are established with government ficers in charge of fisheries development, with naval architects and oat builders and owners. A continuing exchange of experience and formation is thus initiated, often leading to consultations, and extend-l mostly by correspondence, on the design, construction and equip-ent of fishing boats and fisheries research vessels planned by govern-ents and fisheries industries.

While a few scattered naval architects have specialized in this eld, their influence has not been far reaching. In order to stimulate n international exchange of information and experience among naval chitects, boat builders, engine manufacturers and boat owners in ne sphere of small and large fishing boat design and engineering, FAO rganized and conducted in 1953, through its Fisheries Technology ranch, the first FAO International Fishing Boat Congress, with twin

sessions in Paris, France, and Miami, U.S.A. The 70 papers present at this congress, covering fishing boat design, engines, propellers, de gear, factory ships and safety at sea problems, together with t discussions and 600 illustrations, were edited in the Section, a recently published by *Fishing News*, Arthur J. Heighway Publicati Ltd., London, in a 650-page volume entitled *Fishing Boats of World.*

Changes in boat design which lead to improvements in seaworth ness, seakindliness, lower fuel consumption, higher speed, etc., are of great importance. Tank tests on models of new as well as old desig have proven to be efficient means of testing the value of desi and indicating possibilities for improvements. An article on this su ject will appear in *FAO Fisheries Bulletin*, Vol. VIII, No. 4. A lir ited series of resistance tests, including Canadian, Pakistani and U. vessels, have been undertaken on behalf of FAO. In addition, sh testing tanks, shipyards and private persons in many countries ha made the results of their tests on fishing boat models available to FA These tests are now being reduced to a uniform presentation, and th first 150, together with an introductory commentary, will be publishe in 1955 in loose-leaf form, as an *FAO Catalogue on Fishing Boat Tan Tests* which will be enlarged from time to time. Data on propulsio and propeller tests may follow.

Through the Expanded Technical Assistance Program (ETAP FAO has provided naval architects to India and Pakistan t study local fishing boats, suggested improvements in design and con struction, prepared designs and specifications for local types adapte for motorization and mechanized fishing operations and especiall for mechanized fishing craft capable of being beached through heav surfs, a major problem not only in these countries but also in man parts of the world where no natural or artificial harbors exist.

Elsewhere, the increase in size and number of mechanized fishin boats calls for the parallel development of fish harbors and shore fa cilities. India and Pakistan are being provided with ETAP specialis in this field, and local projects in Chile and Israel have been discusse by staff members with the planners concerned.

This Branch Section will also be in charge of engineering advi and assistance in connection with inland fisheries and fish culture ope ations (pond construction) upon the appointment of a staff memb with special experience in this field. Under ETAP an engineer h been assigned to Iraq to survey the needs for fish passes or ladde at the Euphrates and Tigris river barrages.

Fishing Gear and Methods

It is axiomatic that fishing vessels are in a sense merely the vehic which carry the fishermen and their gear to the fishing grounds, all them to operate the gear and then carry them, the gear and the cat back to shore. It is the kind of fish and their behavior in the wat under various circumstances which determine the type of gear a

fishing method most suitable for their capture, and most fitting to the economic circumstances of the country ; this, as well as the distances from shore base to fishing ground, then determines to a large extent the size, type and powering of the fishing vessel. It is the second section of the Branch which is concerned, in close co-operation with both fisheries biologists and fishing boat designers, with fishing gear and its operation. A large part of this activity consists of direct advice, especially through ETAP, on the application of fishing methods and gear, which have proved effective in other regions under similar natural conditions. New fish detection methods, by echo sounder and Asdic, have come to the fore in recent years. These have not only increased the effectiveness of older fishing methods, but have made possible new methods, such as mid-water trawling, thus enabling the fisherman to apply his gear to the catching of schools of fish hitherto inaccessible. The Branch works in close relation with the Biology Branch, and depends considerably on their contributions to the methodology of fish searching. ETAP assignments in which new fishing methods, new gear, new mechanized methods of setting and hauling gear, new gear materials, (e. g. nylon), new artificial lures, etc., are introduced, are currently being carried out in Brazil, Ceylon, Chile, Haiti, India, Iran, Liberia, Saudi Arabia, Syria and Turkey. Other shorter assignments have already been completed in Iraq, Israel, Somalia and Yugoslavia.

As in the other Sections of the Branch, articles from current fisheries literature describing important new developments in fishing gear and methods are abstracted and published in *World Fisheries Abstracts.* At the same time, a more complete annotated bibliography of publications in this field is being assembled and will be published. A worldwide trade directory of manufacturers of equipment of every kind used in the whole field of fisheries technology is also being assembled by the Branch, to enable it to supply its technical assistance experts with suitable equipment for their work and to provide a reference work in replying to the many requests from Member Governments and industry for this type of information.

Through ETAP the Fishing Gear and Methods Section also assists Member Governments in organizing and operating national or regional training centers for fishermen. Such a project is currently in its early stages in India, and in 1956, another may be in operation in the South Pacific area.

Another part of the program of the Section is the preparation of a Handbook on Fishing Gear and Methods, to assemble widely scattered information and make it available in several languages for use in fishermen's training centers and fisheries schools, and by fisheries workers and fishermen in general. The book will consist of chapters written by experts in various countries and edited in the Branch.

In addition, the Section is making preliminary preparations for an international congress on fishing gear and methods to take place in 1956 to bring together gear research workers, gear technologists, manufacturers, government officials in charge of gear development,

and gear operators, i.e. fishermen, to stimulate international exchange of information in this rapidly developing field, to discuss newly developed materials and their efficiency ; proper methods of testing materials and gear ; new methods of gear manufacture, repair, preservation and maintenance ; improvements in fishing gear design based on the application of measuring instruments and direct observation under water of the behavior of fishing gear and the reaction of fish to the gear ; newly developed fish detection instruments and the results achieved ; and new fishing methods, thus stimulating continuous development in gear research and gear testing, a science as yet in its infancy.

Fish Handling and Processing

Finally, the third Section of the Branch is concerned with the whole field of food technology as applied to fish. In addition to what has been pointed out in the opening sentence of this article, it may be stated that the lack of proper fish handling, processing and distribution facilities is often a stronger deterrent to fisheries development than lack of boats and gear. It is evident that no fisheries development can occur beyond a mere subsistence level until proper steps have been taken to assure effective utilization, which is a precursor of effective demand.

Again, some of the work consists of reviewing regularly the literature, and preparation of abstracts for publication in the *World Fisheries Abstracts*. Advisory work is carried on both by correspondence and by visits to member countries. Special attention is being paid to the methods of keeping fish fresh aboard fishing vessels and during handling and distribution ashore. The developments in the sphere of fish preservation by freezing, smoking, salting, drying, canning, etc., are kept in constant review and particular attention is given to methods suitable for warm climates.

The developments in the utilization of waste fish and offal through meal and oil manufacture, especially on a small-scale fishing village level, are also followed, as are the problems of by-product manufacture in general, including the manufacture of liver oils, and the utilization of seaweeds and their refined products in chemical and food industries. Information on many aspects of these developments is furnished to member countries and industries.

In co-operation with the FAO Nutrition Division and UNICEF, advice is being given on the technical aspects of the production of edible fish flour for human consumption, including the possibilities which may exist for its production locally in various countries where large numbers of the population suffer from a lack of animal protein in their diet.

A digest of laws and practices in many countries in the field of fish inspection and commodity standards for fisheries products was prepared in this Section of the Branch, and published in 1953 in English, French and Spanish, under the title : *Commodity Standards for Fisheries Products*. The Section is currently advising the ECE Working Group on the Standardization of Perishable Foodstuffs in its work

in the standardization of fresh fish and salted herring in European trade. The Section also maintains direct contact and exchange of information with the International Committee on Canned Foods and the International Institute of Refrigeration.

In the technical assistance field, projects on fish drying, salting, smoking, refrigeration, canning and fish meal and oil production are, or have been, supervised in Brazil, Chile, Ecuador, Liberia, Turkey and Yugoslavia, and further projects will be undertaken in Israel and Thailand. Brazil and India are receiving assistance in reviewing their research activities in fish handling and processing, and are being assisted in the planning of extended research programs, laboratory facilities and staffing.

In certain specialized fields (e.g. canning), private industry has been leading in some countries in undertaking a considerable research program. In most member countries, however, research work in fisheries technology falls upon governments, and fisheries administrators are more and more realizing the importance of research in fish handling and processing. While research in marine biology has long held a prominent place, even in the less developed countries, fisheries technological (as well as fisheries biological) research has come to the fore only in the last two or three decades.

The Branch Section, in order to stimulate international collaboration in this sphere of activity, and as an outcome of the FAO Meeting on Herring Technology held in Bergen, Norway, 1950, was active in promoting the formation of the FAO Interim Committee on Fish Handling and Processing. This Committee established four working groups, namely : Fisheries Products for Tropical Consumption, Chilling of Fish, Bulk Freezing of Fish, and Pre-packaged Fisheries Products. These have all formulated their work programs, held meetings, and are carrying on their assigned tasks. The membership consists mostly of fisheries research workers from the laboratories of Western Europe, with corresponding members from North America, South Africa and the Far East. An international fisheries technologists meeting, under the auspices of the Committee, is being organized for the spring of 1956, at which the working groups will present their progress reports and discussion will take place on a subject of general interest in a symposium. The Branch provides the permanent secretariat for the Committee.

The services of the Branch as a whole are at the disposal of the technical committees of the FAO Regional Fisheries Councils, and assistance and advice is extended through direct participation at the meetings and discussions of the councils, and through contribution of technical papers and assistance in the preparation of handbooks.

Fishing Boats of the World, which contains the technical material from the papers and discussions of the FAO International Fishing Boat Congress * held in Paris and Miami in 1953, and to which some 140 naval architects, boat builders, marine engineers and other experts have contributed, has now been published.

Part 1 deals with boat types, and includes chapters on short distance, surface, bottom and combination fishing, research vessels, materials, fish holds, economics, and discussions on these subjects. Part 2 is concerned with naval architecture, and includes papers on hull shape, safety at sea, and discussion of various topics under these headings. Part 3 is an engineering section including chapters on engines, propulsion, control devices, deck gear, and discussion on various topics under these headings. The last section deals with factory ships, with particular reference to the experience gained in such notable freezer trawlers as the *Delaware*, the *Fairfree*, and the *Fairtry*.

Each chapter deals comprehensively with its subjects, as in the chapter on boat types which includes papers dealing with hull shapes, and the characteristics, qualities and defects of boats in Belgium, Denmark, France, Western Germany, Iceland, India, Ireland, Italy, Japan, Norway, Pakistan, Sweden, the United Kingdom, the U.S.A. and other countries. The boats are critically examined in a series of articles and, in subsequent discussion, many controversial points are dealt with.

Similarly, in the engineering section, many interesting and controversial points of view have been expressed by experts from Denmark, France, Western Germany, Italy, Japan, the United Kingdom and the U.S.A. Among the engines discussed are low, medium, and high speed Diesels, air-cooled and water-cooled engines, 2-cycle and 4-cycle engines, gas turbines, and Diesel-electric and multiple reduction gear propulsion.

There is a similar comprehensiveness in all the chapters, but it is important to emphasize that *Fishing Boats of the World* is not a text book on naval architecture. It is concerned with that part of fishing boat design which is missing from all text books on naval architecture. It brings under one cover the views, practices, ideas and experience of naval architects, marine engineers and other experts from some 23 different countries, and provides a work of reference for all those engaged in the fishing industry.

Fishing Boats of the World, edited by FAO, is available from the publishers, *Fishing News*, Arthur J. Heighway Publications Ltd., Ludgate House, 110 Fleet Street, London E.C. 4. (650 pp., 600 illus. Price : £4.10.0*d*. or U.S.$12.50).

The first seven numbers in the *FAO Fisheries Papers* series have now appeared. This series intended to cover reproductions of work-

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* See *FAO Fisheries Bulletin*, VI (6), 243-246 ; VII (1), 27-30.

ng papers originated for meetings or in the course of the Division's other activities, which are not official publications of the Organization but are considered to be of potential interest to sections of fisheries workers. This series will also include reprints of articles which have appeared in the *FAO Fisheries Bulletin* and for which there has been a continuing demand.

A strictly limited number of the *FAO Fisheries Papers* is available to fisheries departments of Member Governments and to recognized fisheries institutions, on application to the Executive Officer, Fisheries Division, FAO, Rome.

Proceedings and Technical Papers No. 3 of the General Fisheries Council for the Mediterranean have now appeared. Part 1 covers the proceedings of the third meeting held in the Principality of Monaco, 14 to 19 October 1954 [see *FAO Fisheries Bulletin*, VIII (1), 41-45]; Part 2 comprises the technical papers presented during the meeting. This volume of 518 pages is obtainable either from FAO Headquarters, Rome, or from FAO sales agents. Price : U.S.$5.00 or 25*s.*, or the equivalent in local currency. A certain number of copies are also available for free distribution, and may be obtained on request from the Secretary of the General Fisheries Council for the Mediterranean, FAO Headquarters, Rome, Italy.

Personnel

William A. Dill (U.S.A.) joined the FAO Fisheries Biology Branch on 1 May 1955. He takes over from W.H. Schuster, who left in October 1953, as Chief of the Inland Fisheries Section. For the past seventeen years he has been a member of the California Department of Fish and Game in the U.S.A. He has had experience both in research work and in the management of fresh-water fisheries, and since 1951 has been in charge of the Federal Aid to Fisheries Restoration (Dingell-Johnson) program for the State of California.

Pierre Chimits (France) began his duties as a fisheries biologist with the Biology Branch on 1 April 1955. Formerly a member of the French Inland Fishery Service and Director of the Fish Warden School in the Eaux et Forêts Administration, in recent years he has worked at the Administration's Biarritz Laboratory. He is the author of studies on salmon, carp and pike culture and on fish culture pond management. His article "Tilapia and its Culture" appeared in *FAO Fisheries Bulletin*, Vol. VIII, No. 1.

Expanded Technical Assistance Program

Resumé of progress in fisheries.

Brazil. W.E. Ripley (U.S.A.), marine fishery biologist, is working with a team of Brazilian fisheries scientists at the Marine Fisheries Research Institute, Santos ; in the process of developing a program for assessing available fisheries resources, the members of the team are

using techniques under the expert's guidance for studying fish populations which have recently been developed in this field elsewhere.

Robert E. Lee (U.S.A.), fishery engineer, after preliminary work in the Santos area, has arrived at Recife to undertake exploratory fishing for tuna.

Dr. O.A. Torres Botelho (Portugal), fish processing technologist, is going via Santiago de Chile and Rio de Janeiro to duty in the Amazonas region to try to introduce improved methods in the preparation of dry-salted fish at several points on the Amazon river and its tributaries. The production of dry-salted fish, based chiefly on the pirarucu (*Arapaima gigas*) is already considerable, but the preparation of a good quality product which will travel is handicapped by high humidity conditions and indifferent first processing after catching.

A fishery economist is being recruited to advise the Superintendency for the Economic Development of the Amazon Region on its fishery development program and the structure of its fisheries administration.

Burma. An inland fishery biologist is being recruited to carry out a general assessment of the inland fisheries resources, and to advise where appropriate, on fish culture development.

Caribbean Commission. A fishery specialist is being recruited to advise the various territorial governments in the Commission area on problems of fisheries administration and development.

Ceylon. Einar Kvaran (Iceland), marine engineer, is fully engaged in supervising and carrying out repairs and engine maintenance in the various craft operated by the Fishery Department. The fish landing wharf which is being erected and equipped under the Colombo Plan is now in an advanced stage of construction. Mr. Kvaran is working closely with Colombo Plan authorities on the specification and layout of the workshop facilities to be installed at this wharf, to enable maintenance work on the Department's vessels to be contralized and systematized, and where it is hoped independent small operators may obtain maintenance service. The 40 small marine engines supplied to the Government by the Colombo Plan are being allocated for purchase by small craft operators.

Jon Saemundsson (Iceland), fishery engineer, will concentrate his efforts during the next few months on the development of a two-boat purse seine for use under local conditions, and a two-boat lift trawl for near-bottom dragging with small mechanized craft. Several leading fishermen on the island are interested in the evident possibilities of these fishing methods. Trolling with artificial lures is also being widely demonstrated.

Dr. S.W. Ling (China), inland fishery biologist, has completed a general reconnaissance of the inland fisheries and has now worked out his program, which will include intensification of activity at existing government fishery stations, and a reconnaissance of the brackish water lagoons. He is also making preparations for conducting training courses for local fishery officers.

Chile. Charles Olesen (Denmark), master fisherman, has had some success in demonstrating a mechanically driven line hauler in the Valparaiso area, and proposes to carry out similar demonstrations with a second line hauler provided by FAO around Talcahuano. He has successfully demonstrated improved trolling gear in the tuna fishery, which is already having some effect on increasing the landings by local fishermen.

N.P.Hansen (Denmark), fish handling technologist, is concentrating for the time being on improved methods of smoking and curing. He has already re-activated several smoking plants, which had been built but never used in the absence of the specialized knowledge necessary to get good results.

Prof. J.N.Bahamonde, Chilean, FAO/ETAP Fellow in marine fisheries biology, is studying at the Norwegian Institute of Fishery and Marine Research at Bergen, Norway, and taking part in the current herring research program there. He has accompanied the research vessel *G.O. Sars* to the Barents Sea, and is becoming familiar at all stages with some of the basic techniques for the study of fish populations.

Colombia. Dr.V.Paz-Andrade (Spain), fishery economist, is completing the initial phase of his general economic survey and will report in Rome, Italy, in July. His recommendations are being studied and this work will be followed up by a second expert later this year.

Costa Rica. It is proposed to award a fellowship to a fishery biologist from Costa Rica for study in Panama under M. Burkenroad (U.S.A.), shrimp biologist, at the Government Shrimp Biology Laboratory in Panáma. This will greatly facilitate the launching of a program of assessment of the shrimp resources in Costa Rica as an extension of Mr. Burkenroad's work in Panama.

Curação (Netherlands Antilles). A fishery consultant is being recruited to carry out a reconnaissance survey of the availability of fish and of the possible methods of their catching, storage and utilization ; if appropriate, he will formulate a fisheries development program.

Denmark. Invitations have been sent to a number of countries from Ceylon and India across tropical Africa and through the Near East and the Mediterranean, to participate in the training center for fishery administrators to be held in Denmark for six weeks from 28 August 1955. Using advanced Danish fishery activities for demonstration purposes, the courses are designed for participants holding important positions in the fishery administrations of their respective countries. Special attention will be given to problems of fisheries development and, in this respect, the administrative responsibilities of governments.

Ecuador. The fish meal plant at Manta, although now installed, lacks a connection with the source of electric power and it has not, therefore, been brought into operation. Meanwhile, Karsten Hoydal (Denmark-Faroes), fishery technologist, has been finalizing designs and specifications for fish dry-salting and freezing plants at Manta.

A fish marketing specialist is being recruited to assist the Government in formulating a pilot scheme for marketing and distributing fish products from the Manta area, especially in order to take account of fluctuations in supply.

Egypt. K.W.Jensen (Norway), inland fishery biologist, is co-ordinating a very full program of observations being made by the staff of the Hydrobiological Institute on the hydrodrome near Alexandria. Routine observations include sampling of phytoplankton, and bottom dwelling organisms ; and length frequency and scale observations on species of Tilapia and mullet for age determination. Two biologists from FAO Headquarters — W.A.Dill and N. Bernhard – have visited the project. Mr. Bernhard remained for three weeks to give special attention to phytoplankton work.

A fish processing technologist is under consideration to introduce improved salting and curing methods in the small fishing villages on the Red Sea coast.

A fisheries statistician is being recruited to design improved systems for the collection of fisheries statistics and, where necessary, to organize sampling surveys.

Finland. A water pollution consultant is under consideration to advise on the control of industrial pollution in natural fresh waters for the protection of fish life.

Guatemala and *Honduras.* S. Y. Lin (China) visited Rome for a few weeks in May to report on his general surveys of the inland fisheries in both countries and to plan the next phase of his double mission.

Haiti. Martin Routh (U.K.), fishery engineer, assumed duty in May after being briefed in Rome. On his way to Haiti he stopped in the U.S.A. and Cuba for further background information. He will work on diversifying the fishing methods of small-scale local fishermen, endeavoring to improve their fishing techniques and, where desirable, introducing the use of powered craft and gear.

India. Paul Ziener (Norway), naval architect, has been working in the States of Andhra and West Bengal. In Andhra he designed — and the Government is now building — a 32-ft. Nava-type craft to take a small Diesel engine ; here also he has designed, and the Government has built, an 18-ft. motorized surf-landing boat. He will break new ground when he returns to Bengal and Orissa, and he will advise on the construction of a special craft for estuarine fishery research work. During his recent mission Mr. Ziener had the following craft completely built from his designs: one 44-ft. Satpati-type fishing boat for Bombay ; one 20-ft. surf-landing boat and a 24-ft. fishing boat, *Pablo*, for Madras ; an 18-ft. beach landing craft and a 28-ft. Machwa-type fishing vessel for Saurashtra ; and a 16-ft. inland fishing craft for Nagpur. All these craft are mechanized. In addition, he has under construction a second 18-ft. surf-landing craft for the Madras Government for use on the west coast at Cochin, and a 35-ft. fishing vessel modified from the Tuticorin type for Tuticorin, also on the west coast of Madras State. In all he has

ad at least seven motor fishingcraft built and three more are now under onstruction from his drawing board, in five states. The completed essels are being tried out under varying working conditions in differnt parts of India.

G. Illugason (Iceland), fishery engineer, has been working on both oasts of Madras State as well as in Andhra in close collaboration with Mr. Ziener. He sailed the *Pablo* up from Madras to Andhra and has had encouraging results there with bottom set nylon gill nets ; his nethods have kindled considerable interest among fishermen. He has also sighted schools of tuna. In the near future, he will be trying out the Nava-type craft in Andhra.

In the meantime craftsmen trained by Mr. Illugason are carrying on programs of experimental fishing at both the city of Madras on the east coast and Tellicherry on the west. At Tellicherry, some hauls of shrimp have been taken with light trawls from the 22-ft. Danish-built boat.

Pierre Lusyne (Belgium), fisheries training center specialist, assumed duty in March to help the Government organize training schools for master fishermen. First, he is carrying out a general field survey through the Maritime States, and then he will return to Bombay State to organize the first training school at Satpati, Bombay, in July. This first center will accommodate 20 young progressive fishermen, and will last for about six months. Instruction will be given by four fisheries officers from different states who, at the same time, will be under instruction from Mr. Lusyne and who will, it is hoped, form the nuclei for further fishery schools in the other states to be organized later. Mr. Lusyne has drawn up a syllabus in the light of his field survey around the coast of India in accordance with the special needs of the Indian fishermen. Some instruction will also be given in motor maintenance and operation.

In addition to those previously reported (*FAO Fisheries Bulletin*, Vol. VIII, Nos. 1 and 2), a second fish harbor specialist and a fish marketing specialist are being recruited. The fishery technologist will advise on planning and organizing a fisheries research laboratory for the Federal Government where problems of handling, storage and distribution of fisheries products may be studied.

Indonesia. The International Inland Fisheries Training Center will be opened in Bogor at the end of October 1955, and for six weeks the participants from the Indo-Pacific region will attend lecture courses at Bogor and demonstrations at various centers in East and West Java. The center is intended for senior government officers in the inland fisheries services of participating countries and the courses will be more extensive than those of the two previous centers. Many aspects of inland fishery management and development will be covered and courses will be given on the appraisal of inland fisheries resources, a consideration of socio-economics, the investigation and management of natural fresh-water and brackish-water resources, and recent technical improvements in fish culture.

Iran. Harald Fibiger (Denmark), fishery engineer, has been working with the FAO fishing vessel *New Hope* in the Gulf of Oman and has seen scattered schools of tuna over all the area surveyed, especially off Jask. Sardines have not so far been observed in any quantity during the monsoon months from May to September. Mr. Fibiger is working in a more restricted area in the mouth of the Persian Gulf, where he is trying to fish for sardines, with lights and lampara nets, and will trawl for shrimp and bottom fish.

Iraq. A. van den Eelaart (Netherlands), inland fishery biologist, has been carrying out further observations on the behavior of fish at the existing barrages on the great rivers, and the relation between the timing of fish migrations and flood water levels ; he has also been carrying out observations on the environment in certain lakes, the levels of which are being raised by dam construction for water storage.

A civil engineer is being recruited to advise on the design and construction of fish passes.

Israel. R. Ruppin, FAO/ETAP Fellow, has been visiting fishery schools in the United Kingdom and will continue to study methods of fishery education in other countries in northwestern Europe.

Liberia. Knud Frederiksen (Denmark), fishery engineer, has concluded his program of experimental fishing at various points along the coast in the 22-ft. Danish-built FAO motor fishing boat. During June he was in Rome preparing the report on his work, prior to reassignment to another country.

Libya. A fisheries specialist is being recruited to make a reconnaissance survey of the availability of fish stocks and of possible methods of catching, storing and utilizing fish. As appropriate, he will then advise on a development program.

Mexico. John Fridthjof (Denmark), fishery economist, has developed his program for promoting increased consumption of fish. He is distributing widely a monthly illustrated leaflet and the latest issue shows his schools' program which has developed rapidly. Other activities include campaigns in selected zones based on fish work units; members are drawn from the various interested ministries and agencies and each, in his own field, assumes responsibility for certain sections of the campaign.

Discussions are taking place with the Government on the terms of reference of the expert requested in connection with the " March to the Sea " campaign. It appears that a fishery economist is required to carry out a general economic survey of the industry and to formulate a national plan for development.

Three fellowships are being awarded in various countries on the results of the 2nd Latin American Fisheries Training Center which was held in Mexico City from October to December 1954. *

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* See *FAO Fisheries Bulletin,* VIII (2), 98-101.

Panama. A program of research into the shrimp resources of Panama is now well under way at the National Fishery Laboratory, under the guidance of M. Burkenroad (U.S.A.), shrimp biologist. Mr. Burkenroad reports that the problem of the early life histories of two or three of the least well-known, but dominant species of shrimp is now yielding to intensive investigation. The nursery grounds of one of these species appear to be in the surf and the inter-tidal zone of the open sea coast, and in the mouths of the estuaries. Other species follow the more familiar pattern of passing through development stages in brackish conditions found in lagoons and estuaries.

Paraguay. Dr. Otto Schubart (Brazil) inland fishery biologist has been assigned to carry out a general survey of the inland fisheries resources in Paraguay.

Saudi Arabia. G.G.Ferrer (Philippines), fishery engineer, has carried out four survey trips in a local vessel chartered by the Saudi Fishing Company, to ascertain the fishing areas which would be of interest for the future operations of the Company. Multiple trolling results have been promising and this technique is being followed up systematically. Further experimental work is planned with bottom set gill nets and with a Philippine-style lift net. Mr. Ferrer has twice visited Egypt to advise the Company — a government-sponsored concern with participation by private interests — on the purchase of fishing gear and materials for making up various types of nets.

Syria. An expert is being recruited for a period of three months to carry out a reconnaissance survey of the marine fisheries, based at Latakia.

W.C. Beckman (U.S.A.) is being recruited as inland fishery biologist to survey available resources in the natural fresh waters and advise on fish culture possibilities.

Turkey. The Meat and Fish Office of the Ministry of Economy and Commerce has established, staffed and equipped a Fishery Research Laboratory at Istanbul, to which the Meat and Fish Office research vessel *Arar* is now assigned. Under the guidance of Olav Aasen (Norway), marine fishery biologist, a very full program is being developed to assess available fish resources, especially in the Black Sea and the Sea of Marmara. The possibility is being explored of a correlation between the distribution of anchovy and surface water temperatures, and Mr. Aasen intends to launch an intensive program of fish tagging, using the Lea hydrostatic tag.

Jon Einarsson and R. Gudmundsson, fishery engineers from Iceland, have fitted out a government vessel for purse seining, and have trained the crew to set and haul in readiness for the next schooling seasons of anchovy and horse mackerel. Mr. Einarsson will continue this work and Mr. Gudmundsson will develop a trawling program.

Dr. A.A. Dawson (U.K.), fish marketing specialist, assumed duty in Turkey in May, and after carrying out a general survey of the mar-

keting and distribution of fish products in the country, he will endeavo to introduce measures to ensure wider and more efficient distributio of fish.

A fellowship has been awarded to Mr. Aasen's Turkish counter part worker, I.M. Artüz, who will study with Mr. Aasen's colleague in the Fishery Research Laboratory at Bergen, Norway.

Yugoslavia. Mrs. Mihajlovič-Babuder's final report of her studie in Germany is being reviewed at FAO Headquarters.

A fellowship has been awarded to S. Zupanovič in fisheries sta tistics. After general training in the U.K., Norway and Denmark, he will undertake an extended mission in certain member countries of the General Fisheries Council for the Mediterranean to compare the varying systems of collection and compilation of fisheries statistics.